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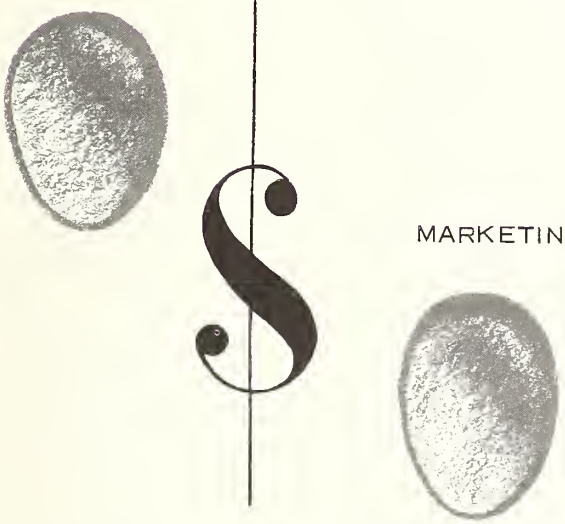
REPORTING

EGG PRICES AT SHIPPING POINTS

IN IOWA AND MINNESOTA



MARKETING RESEARCH REPORT NO. 445

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
MARKETING ECONOMICS RESEARCH DIVISION

PREFACE

Decentralization in the marketing of eggs, particularly since World War II, has reduced wholesale selling in terminal markets. Some groups believe that price reporting at the wholesale level is not adequate for all industry needs because of fundamental changes in the industry.

Research was initiated in 1957 to test the feasibility of developing a shipping-point price report. Of all the States, Iowa and Minnesota produce the largest surplus of eggs over local needs, and they were therefore selected for the study. After a survey of pricing practices used by egg assemblers, it was decided that a price report could be issued for net prices received by the assemblers. On this basis, experimental price reporting was begun, and price reports have been issued to the public twice each week from April 1958 to the present (fall, 1960).

This publication summarizes the results of the research on the problem and analyzes the reports issued during 1959. It supplements earlier research on egg pricing in New York City, Chicago, Los Angeles, and St. Louis, and indicates needs for further research in the important area of egg pricing.

The studies conducted on this problem are part of a broad program of research by the Agricultural Marketing Service to increase efficiency in marketing farm products.

The authors appreciate the cooperation given by R. S. Cotter and other personnel of the Dairy and Poultry Market News Branch, Agricultural Marketing Service, in the development of this research. Personnel of the Dairy and Poultry Market News office at Des Moines conducted most of the fieldwork and started the actual reporting of egg prices. These include W. O. Winters, J. H. Mitchell, and Mrs. Ann Still. Numerous egg handlers willingly supplied price and volume data for this research and for the continuing reporting service.

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Washington, D. C. January 1961

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. - Price cents

SUMMARY AND CONCLUSIONS

Research was conducted during 1957-59 to test the feasibility of developing periodic reports of prices received for eggs by country-point dealers in the Midwest. Information was obtained first on pricing practices and other terms of sales, from a sample survey of egg assemblers in Iowa and Minnesota.

It was found in 1957 that trucklot shipments of eggs from Iowa and Minnesota went to almost every State, but the predominant movement was to cities in the Northeast. Transportation charges were primarily a complex function of distance. Typical charges from Iowa-Minnesota shipping points were: To Chicago, 1 cent a dozen; Atlanta, 2 cents; and New York City, 3 cents.

Sales by type of outlet in 1957 were: To wholesale receivers, 71 percent; chainstores, 7 percent; egg breakers, 13 percent; and brokers, 9 percent. Shipments to wholesale receivers in terminal markets were typically truckload lots of 500 to 600 cases of eggs, but shipments to breakers and other less distant outlets were in smaller lots.

The volume of sales varied by day of the week as follows: Monday 25 percent, Tuesday 25 percent, Wednesday 21 percent, Thursday 12 percent, and Friday 17 percent. The three major packs of eggs sold were: (1) Wholesale graded and packed "loose" (in 30-dozen cases), (2) consumer graded and packaged in 1-dozen cartons, and (3) breaking stock. Fiber egg cases, including flats and fillers, cost an average of 55 cents each at the time of the survey, and were included in the price in sales of table eggs. In sales to egg breakers, the cases were exchanged and therefore were not included in the price.

A wide variety of pricing practices existed among egg assemblers. On most of the sales, eggs were priced under a variety of agreements, most of them oral. The major kinds of sales were: (a) Day-of-arrival sales, (b) day-of-shipment sales, (c) entirely negotiated sales, and (d) combination of methods.

Prices were established on about 75 percent of the sales on the basis of day of arrival of the eggs at the terminal market, using a base price, usually a market quotation, plus a premium or minus a discount. On about half of these sales, the premium or discount was negotiated or subject to negotiation from shipment to shipment. The shipper usually paid for the transportation and bore the risk of price change until arrival at market.

Prices were established on about 15 percent of the sales on day of shipment of the eggs from the shipping point. Typically, price was determined on the day of shipment, using a base price, usually a quotation, minus a discount. Here, also, the amount of discount from the base price was subject to negotiation on about half the sales. The buyer usually paid the transportation and bore the risk of price change.

On about 5 percent of the sales, the buyer and seller bargained or negotiated price and other terms of the individual sale. No base price quotation was used, although buyers and sellers probably knew what the quotation was at the time price was determined.

Many variations of the three major kinds of price determination were found. For example, some sales were based on a weekly average of the base price quotations. About 5 percent of the sales were on the basis of one combination method or another.

The base price quotation published at New York City by the Urner-Barry Publishing Company was the one most widely used to establish trading levels or to arrive at final prices. It was used not only for eggs sold at New York City, but also for table eggs sold in most other cities. Other base prices, primarily the Market News Survey and the futures prices--both published at Chicago--were used on some sales.

Although a multiplicity of pricing practices were used, it was hypothesized that a periodic report of prices received by shippers could be put on a common time basis. Thus, a "net price received" concept was developed which utilizes pricing information obtained on day-of-arrival sales, day-of-shipment sales, entirely negotiated sales, and combination sales. The common denominator is time, and all prices are brought to the basis of "net prices received today."

Prices are collected twice each week from a sample of cooperating firms. The data are collected by telephone by market news reporters at Des Moines, summarized, and released to the public by 1:00 p.m. the same day. Current net prices received by trucklot shippers, and supply and demand conditions are summarized in the reports.

The reports enable individual shippers to compare the prices they obtain with those obtained by other shippers. Buyers in the most distant markets can compare the prices they pay with those paid by other buyers on purchases made in the Iowa-Minnesota surplus egg basket. The reports provide market news reporters and others in terminal markets with check data on prices paid by wholesale receivers.

In addition to providing information on supply, demand, and price, the reports also reveal that important arbitrage functions are performed among markets in the various geographical areas, between present use and future use, and among end uses. The reports help the shippers and buyers in performing these functions by summarizing marketing information which could be obtained by individuals only at high cost. The Iowa-Minnesota price reports show the ranges of net prices received by shippers for the various qualities, sizes, and services sold. The volume sold at each price is reported.

"Mostly" prices (the prices at which most of the eggs are sold) or average prices computed from these reports are subject to variation, due to (1) changes in the base prices, (2) the relationships to New York of prices in other reports also used as base prices by some firms, (3) the degree of negotiation, both of absolute prices and transportation charges, and of new differentials, (4) the proportions of all shipments going to premium-differential outlets, and (5) sampling variation as such.

The reports were designed to estimate averages of the net prices received, which, 95 percent of the time, would be within 0.5 cent of the true averages, regardless of the five sources of variation mentioned. It was found that information for each reporting period on from 12 to 18 sales of each classification would provide this degree of precision.

In 1959, the "mostly" prices did not go below the New York base price quotation less transportation cost. The "mostly" prices, computed from data for which volumes were 5,000 cases or more, fell within 0.5 cent of the New York quotation minus 2 cents, about 90 percent of the time, despite the possible variations mentioned.

The volumes going to make up the reports were adequate, on the average, to give 0.5-cent confidence limits for Grade A large mixed color eggs on Mondays. Seasonal differentials varied among the grades of eggs. They varied most for Grade A medium mixed colors.

The research conducted during the development of the Iowa-Minnesota shipping-point price report on eggs suggests the following:

1. Since the report furnishes information useful to shippers, receivers, and others on supply, demand, and prices on a current basis, the report should be expanded to cover a wider region, so that the pricing and other information will be even more useful and statistically more accurate. The relationship of transportation charges to distance suggests that expansion to new areas around Iowa and Minnesota would not increase the daily range of net prices substantially. (On May 3, 1960, Wisconsin was added to the States included in the shipping-point price report for eggs.) An alternative would be to cover a greater number of firms in the present statistical universe.

2. The Iowa-Minnesota price series would be among the first to show indications of and the degree of departure from normal price relationships among markets and outlets competing for Midwestern eggs. The statistical analysis does not show any significant difference, at present, between the day-to-day trends in the Iowa-Minnesota shipping-point prices and the base price quotations at New York City. Nonetheless, it does show evidence of seasonal changes which should interest buyers and sellers.

REPORTING EGG PRICES AT SHIPPING POINTS IN IOWA AND MINNESOTA

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BACKGROUND AND OBJECTIVES

The object of the research project reported here was to test the feasibility of developing periodic reports of prices received for eggs by country-point dealers in the Midwest. Prior to this study, there was no published report at that trading level in the Midwest. Price reports on eggs covered only prices paid to farmers and prices at wholesale or other levels of trading, in various cities such as New York, Chicago, and St. Louis.

For many decades, the base price quotations (5, 8) 1/ established at New York City and Chicago by commercial reporting agencies have been used as the primary basis for determining values for eggs shipped from assembly points in the Midwest. This method of pricing prevailed also on eggs shipped to other cities. In addition to the private quotations, the Federal-State Market News Service published reports of wholesale selling or f.o.b. market prices in these cities. In the 1950's, there developed an increasing trade demand for country-point price reporting by the Federal-State Market News Service. This demand resulted primarily from decentralization in the marketing of eggs, which has brought about a relative decline in the volume of wholesale selling in terminal markets. Some groups believed that price reporting at the wholesale level was not adequate for the industry's needs, and should be supplemented by country-point price reporting.

To determine the feasibility of establishing a country-point price report for shell eggs, the following criteria were used: (1) Information on transactions to be included in a particular report must be accurate, and fairly uniform as to the more significant terms of trade, product characteristics, and time of sale; (2) prices and other conditions of sale for a significant proportion of these transactions must be subject to independent negotiation; (3) it must be feasible to obtain and report these prices promptly; and (4) the information reported must be potentially useful for decision making in the industry.

The method of investigation involved two stages: (1) An initial survey of egg dealers to obtain information on their selling and pricing practices and on the terms and conditions of sale on their last two shipments, and (2) initiation of an experimental price report to test the feasibility of collecting and reporting prices on a current basis.

Since April 1958, an "Iowa-Minnesota Shipping-Point Price Report for Eggs" has been issued twice a week. The data are collected by market news reporters at Des Moines, Iowa, by telephone, on Mondays and Thursdays. By 1:00 p.m. Central Standard time on each reporting day, the information is summarized and released to the public. The published report is included as part of the "Egg Report" issued the same day by the Chicago and other offices of the Dairy and Poultry Market News Service.

1/ Underlined figures in parenthesis refer to items in section on Literature Cited.

Although the feasibility of establishing a shipping-point price report was demonstrated--which was the object of the research--some problems remain. Among the unanswered questions are: What factors affect the position of individual firms in the premium-discount structure? Under what conditions and how frequently does the relative position of the individual firm change? Can the influence of individual markets be discerned in the net prices at Midwestern shipping points? The influence of different types of outlets? If base price quotations reflect values where marginal supply and marginal demand are equated, how long can net prices received in surplus production areas, such as the Midwest, remain different than transportation, quality, and service differentials would indicate? If open-market trading declines to the point where it will no longer be feasible to establish base price quotations in specific markets, where and how will a price-facilitating or price-discovery mechanism be established?

For some other commodities and markets, 2/ the base price reports have shifted to other than the wholesale trading level, and in some instances to concentrated surplus production areas. However, this reporting venture was aimed at supplementing Federal-State Market News Service reports of wholesale f.o.b. and selling prices, not at developing a new mechanism for base price discovery as such. The research was not concerned directly with questions of "fair" price or of pricing efficiency.

Methods Used

Preliminary information was gathered on the number, size, and location of shippers of shell eggs, and on their selling practices and methods of price determination. Iowa and Minnesota were selected for this work because (1) they contained the area of largest surplus egg production, (2) these States had numerous egg dealers, many of whom shipped to consuming markets on a year-round basis, (3) the large volume of eggs handled and shipments out of the area indicated the possibility that there might be a sufficient volume of homogeneous pricing information to support a new report, and (4) the Dairy and Poultry Market News office at Des Moines contained experienced reporters who were willing to cooperate in this experiment.

Lists of firms were available from the State departments of agriculture, personal knowledge of the market news reporters, and surveys of egg assemblers (4) conducted in conjunction with development of the Commercial Egg Movement Report (3). The work was begun in Iowa and later extended to Minnesota. However, from the beginning it was necessary to select a sample because of the large numbers of egg handlers in Iowa. The firms were arrayed by size, and all that handled 1,000 or more cases of eggs a week were included in the sample except plants of vertically integrated firms (intracompany transfer prices of integrated firms were not deemed to be suited for price reporting purposes). The assumption was that the large firms would have one or more truckloads to sell every week and would be able to report prices received more frequently than could the smaller firms. It was recognized that this limited the universe studied, and it was assumed that this might bias both the level and the structure of prices reported. The possibility that pricing practices of small firms would be generally similar to those of the large firms was tested by including a varying proportion of the smaller firms in the initial survey sample (see appendix, p. 38, for the sampling plan).

A stratified random sample of 92 firms was selected in Iowa, and all of them were surveyed by personal interview during the summer of 1957. Usable schedules were obtained from 56 firms. The rest could not provide information because some were

2/ In the Los Angeles egg market, prices to producers are based on prices to retailers as reported by the Federal-State Market News Service (6).

out of business, some were members of integrated organizations, and some were assembling eggs for larger dealers on a commission basis. The survey was expanded into Minnesota, but only as a test in a sequential sampling process. Nine usable schedules were obtained, and they showed little variation in pricing practices from those used in Iowa. A lack of personnel for more fieldwork necessitated this approach, but more firms were contacted by telephone later to determine their willingness to cooperate in price reporting.

In the total of 65 usable field schedules obtained, 50 firms handled 1,000 or more cases of eggs a week. Returns received in a previous mail survey of egg assemblers, in the development of the Commercial Egg Movement Report, showed there were at least 103 firms handling 1,000 or more cases of eggs a week in the 2 States. Allowing for nonresponse, this figure might have been increased to about 125 or 130 firms. Even so, the 50 firms handling 1,000 or more cases of eggs a week represented about 40 percent of all firms most likely to be able to provide price information.

The questions used in the survey called for (1) information on customary pricing and marketing practices, and (2) specific information on the last two shipments.

1957 Survey Results

Summarization of the schedules obtained in the field survey revealed information on marketing outlets, size of shipments, transportation and other costs, marketing services performed, volume of sales by day of week, and pricing practices. Further verification of the survey findings was obtained when actual price collection twice a week was begun in March 1958.

Marketing Outlets

It was found that trucklot shipments of eggs from Iowa-Minnesota points went to almost every State. Eastern cities received most of the shipments, while Southern cities ranked second. West Coast cities received shipments mainly during December, January, and February. Some seasonal variation in destinations became apparent when regular reporting had been under way for some months, but this did not reduce substantially the flows to Northeastern markets.

Variation was apparent also in sales by type of outlet. The shippers sold eggs to wholesale receivers, chainstores, and egg breakers, and through brokers. The survey results in 1957 showed the following distribution of sales by type of outlet: Wholesale receivers 71 percent, chainstores 7 percent, egg breakers 13 percent, and brokers 9 percent. The seasonal variation among outlets served was not explored.

Size of Shipment

Variation in the size of shipment appeared to be associated with type of outlet and destination. Shipments to wholesale receivers and chainstores in distant terminal markets such as New York City, Boston, Philadelphia, and Baltimore were typically truckloads of 500 to 600 cases. Sales of smaller loads were made to intermediate destinations. Figure 1 shows a truck being loaded for shipment to a distant city.

Shipments to egg breakers in cities such as St. Louis, Kansas City, and Chicago were typically truckloads of 200 to 500 cases. Sales of smaller lots were made to nearby egg breakers. On many of the latter sales, the eggs were picked up by the buyers.

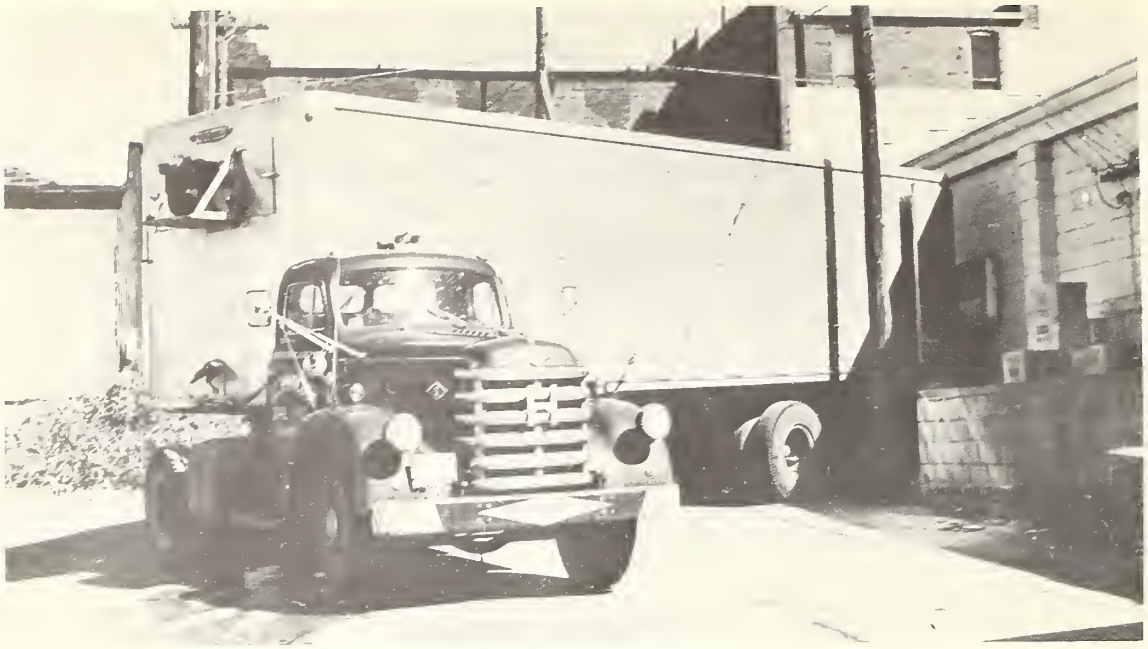

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Figure 1.--Loading a truck with eggs for shipment to a distant city.

Transportation and Other Costs

The survey showed that transportation charges for shell eggs are primarily a complex function of distance (fig. 2). These charges are affected by size of trucks, refrigeration, need for extra drivers, backhauls, and so on. For instance, typical costs for trucklot shipments from Iowa-Minnesota to Chicago are 1 cent a dozen, to Atlanta 2 cents, and to New York City 3 cents. Other costs include the Federal transportation tax of 3 percent of the trucking rate and, when applicable, a brokerage fee of 0.5 cent a dozen for selling the eggs. Transportation costs to New York and other Eastern cities were the same for shippers in both the eastern and western parts of Iowa. In fact, figure 2 shows that transportation costs were 3 cents a dozen for distances ranging from 1,150 to 1,750 miles. The smooth curve shown in the figure explains 95 percent of the variation in transportation charges for about 440,000 cases of eggs.

Marketing Services Performed

The egg assemblers and dealers performed the typical marketing services of assembly of small lots, grading and packing, and shipment to buyers. The largest proportion of eggs handled were graded into wholesale grades and packed "loose" in 30-dozen fiber cases. Practically all of the shipments were by motortruck. Additional marketing services performed by some firms for part of their outputs consisted of consumer grading and cartoning, and of shell protecting the eggs by spraying them with a colorless, odorless, tasteless mineral oil. Premiums of 0.5 cent a dozen were obtained for eggs that were shell protected. Eggs that were consumer graded and cartoned brought 4.0 to 9.0 cents a dozen more than eggs sold in straight wholesale packs. Some buyers at certain times of the year, particularly just before Easter, paid the egg assemblers a premium of 1.0 to 1.5 cents a dozen for white eggs that were obtained by sorting mixed colors.

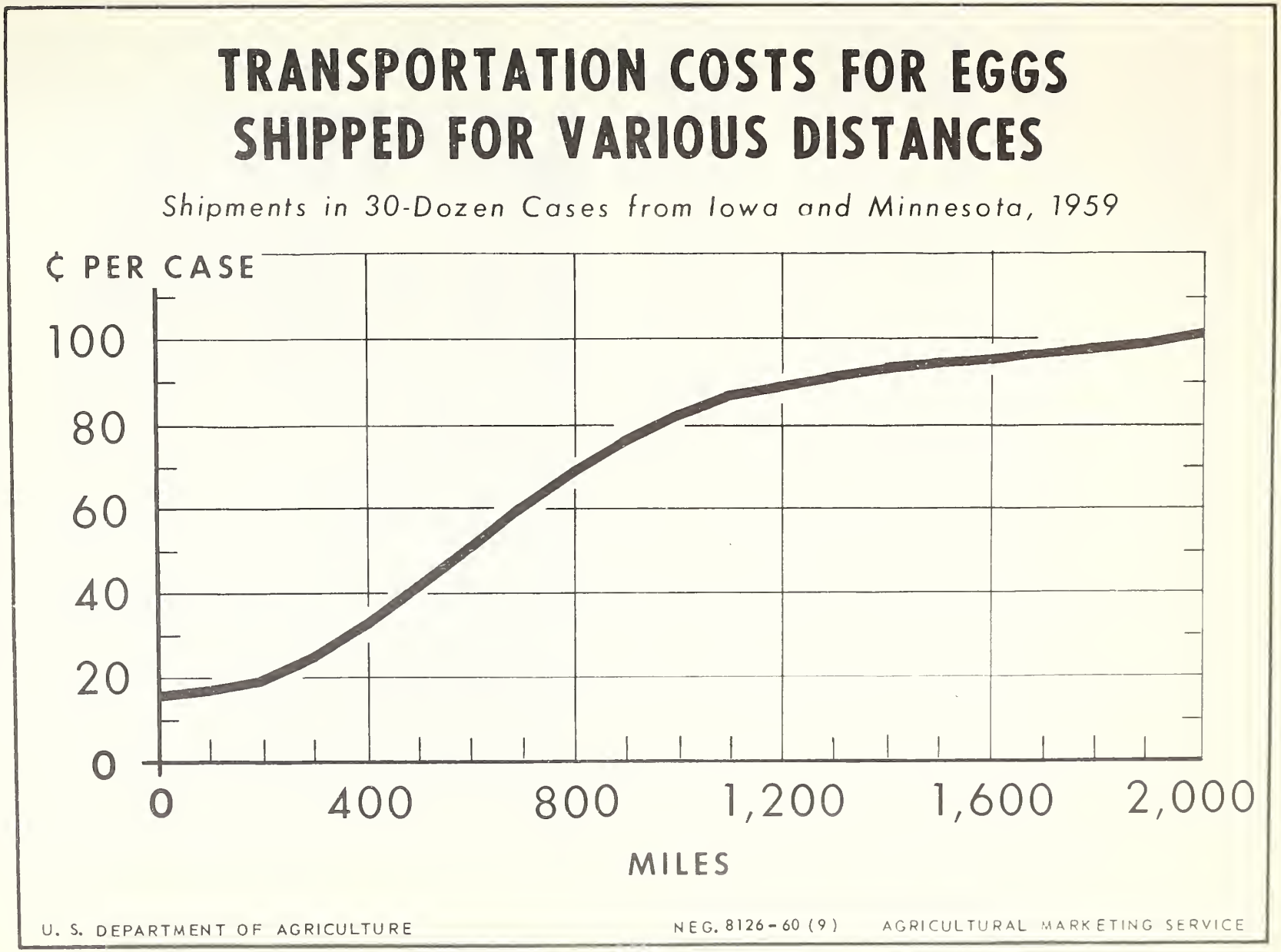
TRANSPORTATION COSTS FOR EGGS SHIPPED FOR VARIOUS DISTANCES
Shipments in 30-Dozen Cases from Iowa and Minnesota, 1959
¢ PER CASE
100
80
60
40
20
0
0
400
800
1,200
1,600
2,000
MILES
U. S. DEPARTMENT OF AGRICULTURE
NEG. 8126-60 (9)
AGRICULTURAL MARKETING SERVICE

Figure 2

Volume of Sales by Day of Week

The distribution of egg sales by day of the week indicated when it would be most feasible to issue a price report. The survey revealed the following distribution: Monday 25 percent, Tuesday 25 percent, Wednesday 21 percent, Thursday 12 percent, and Friday 17 percent.

Major Kinds of Packs Sold

The three major packs of eggs sold were: (1) Wholesale graded and packed eggs, (2) consumer graded and packaged eggs, and (3) breaking stock. Figure 3 shows grading and packing operations in an egg assembler's plant.

The wholesale packs were generally sized and graded according to wholesale standards. Most of the eggs were sold as mixed colors (whites, browns, and tints). Packs with 70 to 80 percent Grade A large and 70 to 80 percent Grade A medium predominated. Actually, many lots of large eggs contained higher percentages of Grade A, some Grade AA, and some extra large. Many of the fresh packs and most of the packs for storage were shell treated. They were packed "loose" (in filler flats or flats and fillers) in 30-dozen fiber cases. The cases and inner packing materials cost 55 cents, on the average, and this cost was included in the price received.

The consumer packs were sized and graded according to consumer grade standards. Most of these eggs were sold as Grade A large and Grade A medium mixed colors. Many of these packs were shell treated. The eggs were packaged first in 1-dozen cartons and then packed 24 or 30 cartons to the case. Some firms packed 15 cartons to a half-sized case. The cost of the cartons and cases was included in the price received by the country shippers.

N-37119

Figure 3.--Grading and packing operations in an egg assembler's plant.

Breaking stock usually consisted of undergrade eggs or Grade B eggs, but in some instances, nest-run or current-receipt eggs, containing all grades and sizes, were used. During the main breaking season and for special packs, better grades of eggs were used. Shell color is not a factor in pricing breaking stock, but premium prices were paid for heavy weights because they yield a greater amount of liquid egg. The eggs are not shell treated. They are packed "loose" in 30-dozen cases, and the price typically did not include the egg case with its fillers and flats or filler flats; cases are exchanged.

Pricing Practices

On approximately 95 percent of all sales in the 1957 survey, prices were determined through a formula agreed upon by buyer and seller at some time before the sale. The factors in the formula, such as volume, differential from the base price quotation, and time at which ownership or title changed hands, were all subject to negotiation. However, such agreements are often called "continuing agreements," because they continue in effect from the time the agreements are made until the sales are consummated or the agreement is changed. In a number of instances, buyers and sellers enter into such agreements with the expectation that identical terms on a series of transactions will be satisfactory to both parties. Those agreements continue in effect until one or the other of the parties asks for a renegotiation of one or more of the terms.

Typically, the continuing agreements for table eggs were related to the base price quotation of the Urner-Barry company at New York City. Many sales of breaking stock were related to the base price quotation of the Market News Survey 3/ at Chicago, and some sales of storage packs were based on the futures market price at Chicago. On perhaps 5 percent or less of the sales, prices were determined by negotiation or bargaining outside the continuing agreements. On some sales, a part of the lot was priced under a continuing agreement and a part priced by negotiation. This occurred for sales where part of the load consisted of grades or quantities not covered by the continuing agreement.

Day-of-arrival sales.--Prices were established on approximately 75 percent of the sales on the basis of day of arrival of the eggs at the terminal market plus a premium or minus a discount from a base price quotation. The shipper paid the transportation costs and bore the risk of price change until arrival at market. The base price quotation most frequently mentioned for table eggs was the Urner-Barry price in New York City for Midwestern Fancy Heavyweight Mixed Colors, although the Chicago Market News Survey price was used also.

The base price quotation most frequently mentioned for breaking stock was the Chicago Market News Survey price for Grade B, Checks, or Dirties, depending on the quality of the eggs sold. In a few instances, the futures market price at Chicago was mentioned as the base price for storage-packed eggs, but many of the "deals" here may have been simple hedges handled by brokers trading in futures contracts. The premium-discount structure on wholesale packs varied from 3 cents above to 3 1/2 cents below the agreed-upon base price quotations, most of the arrangements falling within the range of 3 cents above to 1 cent below.

The base price quotations for New York City were used for shipments to many other markets as well. For example, a buyer in Atlanta might agree to pay the flat market price, day of arrival. In this case, the price to the shipper would be determined by taking the base price at New York, say 40 cents a dozen the day the eggs arrived at Atlanta, subtracting transportation costs of 2 cents a dozen from Iowa to Atlanta, to

3/ This is a commercial price quotation and should not be confused with the USDA's Dairy and Poultry Market News Service price reports.

arrive at a net price to the shipper of 38 cents. The key feature of this kind of price determination is the time or day of arrival of the eggs at the buyer's place of business, regardless of where the buyer is located. The price differential on each shipment is negotiated or is subject to negotiation for more than half of such sales included in the semiweekly market news report. Most of the sales were priced as of the day of arrival for shipments to the Northeast, South, and West.

Day-of-shipment sales.--Prices were established on approximately 15 percent of the sales on the basis of day of shipment of the eggs from the shipping point. Such sales might constitute backhaul opportunities for buyers, and the buyers typically paid the transportation agency and assumed the risk of price change during transit. The price was determined on the day of shipment at the shipping point, minus a discount from a base price quotation. For example, the transportation cost from Iowa to New York City is 3 cents a dozen, and when the seller sells on a day-of-shipment basis equivalent to 3 cents under the base price, he receives the base price less transportation cost; but if he sells at 2 1/2 cents less than the base price, he receives a premium of 1/2 cent over the base price less transportation cost.

Entirely negotiated sales.--In 1957, on approximately 5 percent of the sales the buyer and seller bargained or negotiated over price and other terms of each sale. The base price quotation was not used as an integral part of this method of determining price, but it may have been used as a benchmark in the minds of the buyer or seller or both. Transportation costs and other conditions of the sales also sometimes were negotiated. Sales of eggs to breakers, particularly of less-than-truckload lots, were the largest class of merchandise for which prices were negotiated. A few firms negotiated prices on all of the eggs sold, but more typically the price would be negotiated on only part of a load, such as the Grade A small eggs or the Grade B large eggs not covered by a continuing agreement. Some negotiation may have been for loads that had been rejected by receivers due to low quality or other defects.

Combination of methods.--Numerous variations of the three major kinds of price determination were found. Prices were determined by a combination of methods on approximately 5 percent of the sales. For example, some sales of cartoned eggs were based on premiums above a weekly average of a base price quotation, some sales were based on a base price quotation of the day prior to shipment, and some were based on a base price for a particular day of the week. The division of the risk of price changes between buyer and seller appears to be a good explanation of the diverse methods used in price determination, some sellers wishing to insure their margins by both buying and selling given lots of eggs on concurrent quotations. Others were willing to risk their margins to some extent by paying for eggs on a current quotation and selling on a later one.

The "Net Price Received" Concept

Although the survey revealed a multiplicity of pricing practices among egg shippers in Iowa and Minnesota, it was hypothesized that a report of prices received by shippers could be developed by commingling information from sales that had a common basis of time. This would have the advantage of permitting maximum utilization of the information obtained on different kinds of sales. The "net price received" concept utilizes information for the following kinds of sales:

(1) Day-of-arrival sales. On shipments made 1, 2, or 3, days ago, the shipper knows his net price today because he knows the day of arrival at destination, the base price quotation to be used, the actual base price as of today, his premium or discount,

and his transportation costs. From this information, the shipper or the market news reporter can compute the net price with a high degree of assurance. 4/

(2) Day-of-shipment sales. The shipper knows his net price today because he knows the day of shipment (today), the base price quotation to be used, the actual base price quotation, his premium or discount, and his transportation costs, if any.

(3) Negotiated sales. The shipper knows his net price today because the sale is completed today and the eggs are loaded out.

These three major types of sales and methods of price determination, along with combination methods, can be commingled in arriving at the full range of net prices received because they are brought to the common basis of prices received today. The net price concept reduces the number of classifications required in reporting as compared to reporting gross prices. Also the procedure developed for deriving net prices can reduce the range of prices reported. For example, three sales may be priced on a particular day, one at 38 cents f.o.b. shipper's plant, another at 39 cents delivered Chicago, and the third at 41 cents delivered at New York City. Subtraction of transportation costs of 1 cent in the Chicago sale and 3 cents in the New York sale gives a net price of 38 cents. Thus, the net prices at the country shipping points would be 38 cents for all three sales while the gross prices would vary from 38 to 41 cents. This concept is the basis of the prices reported in the Iowa-Minnesota Shipping-Point Price Report for Eggs.

EXPERIMENTAL PRICE REPORTING

To initiate price reporting, a sample of firms was selected, and decisions were made on the kinds of information that would be collected and the kind of report that would be released. Thirty firms in Iowa and Minnesota, each of which handled more than 2,500 cases of eggs a week, were designated as a "large" size group. This group was divided into 3 subgroups which were rotated each time prices were collected. Fifty firms that handled from 1,000 to 2,500 cases of eggs a week were designated as a "medium" size group. This group was divided into 5 subgroups which were rotated each time that prices were collected. Smaller firms were not included because they would be able to report pricing information less frequently than the larger firms, and telephoning them would increase unduly the cost of data collection. Twenty firms (10 large and 10 medium) were telephoned each reporting day at the beginning of the service, and the subgroups were rotated as described above. After a short period, it became obvious that a larger sample was needed, and the frequency of rotation was adjusted to day-by-day needs for smaller or larger samples. In essence, daily sampling was changed to a sequential basis for a time. Later, a relatively fixed sample was contacted every day.

During the spring of 1958, the market news reporters obtained the following information for each sale of eggs: Date of sale, number of cases, grade, size, shell color, loose or cartoned, natural or processed (oil treated), marketing costs, destination (city or State), gross price, base price quotation (including the amount of premium or discount), and net price. From time to time, adjustments were made in the list of items.

4/ Although a test of the actual reliability of such estimated prices relative to actual prices was not made for eggs, some insights can be gained from such a test for butter. Butter was included in this same price reporting project. The test for butter revealed that 95 percent of all such estimates would fall between 0.04 cent per pound below and 0.14 cent above actual prices. Unpredicted rejections by buyers for quality, weight, condition, and so on constitute the major cause of such differences (7).

By June 1959, information on each sale was being obtained on: Date of sale, number of cases, grade (for both consumer and wholesale grades), size, color, packaging (bulk or cartoned), natural or processed, destination (city or State), marketing costs, gross price, base quotation (including the amount of premium or discount), net price, whether or not it was a f.o.b. sale, if the price was day of shipment, day of arrival, or negotiated, and whether or not the eggs were sold under a continuing agreement. The increase in the list of items can be readily noted. At the beginning of a new price report, it is not possible to know precisely the items that will be needed. Also conditions may change, and reporting methods and definitions consequently may need to be revised.

Price collection was begun February 20, 1958, by the market news reporters at Des Moines. Initially, telephone calls were made on Tuesdays and Thursdays to the rotating sample of firms. Information was obtained on Tuesday for sales made on Monday and Tuesday. Information was obtained on Thursday for sales made on Wednesday and Thursday. It was apparent that the 2-day time period was too broad for purposes of commingling current egg prices. Frequent sharp changes in the base price quotations caused wide ranges in the net prices received by trucklot shippers. Therefore, on April 1, 1958, the procedure was changed so that the prices obtained on Tuesday were for sales only on Tuesday, and Thursday prices for Thursday sales only. Later the days for price collection were changed to Monday and Thursday to even out the workload for the market news reporters at Des Moines. Figure 4 shows the market news reporters at Des Moines gathering egg pricing information, dictating the report, and sending the report over AMS leased teletype.

At first, the data were summarized as price ranges and a "mostly" or modal price. However, when the first report was issued to the public on April 29, 1958, it was released as a volume-price report; that is, the total volume and range of prices for the grade, and the percentages of volume sold at each price within the range were given. The frequency distribution resulting from this procedure provides more potentially useful information than does the traditional style of market reporting in which only the price range and "mostly" price is given.

The market news reporters found that some firms on the original list had gone out of business, and some could not or would not cooperate by giving pricing information. The list of firms in the sample shrank from 80 to about 60. Later the list was increased to 70 firms. Another problem arose when some of the 20 firms contacted in the rotating sample did not have sales on a report day, and when the sales were scattered over a wide range of grades and sizes of eggs. In market news terminology, this problem or condition is called "too few sales to report a price." So that a report could be issued each time, it was decided that all of the firms in the large-firm stratum of the sample would be contacted for each report. During the latter months of 1959, the market news reporters increased their telephone calls to 70 firms each time the price report was prepared. Figure 5 shows the location of cooperating egg assemblers during December 1959. Statistical analysis of information obtained on sales of eggs indicated that information on 12 or more sales of eggs of a particular classification would give estimates of average prices within 1/2 cent of accuracy 95 percent of the time. 5/

Another major change in reporting procedure was the introduction of a net price received at shipping points for cartoned eggs, beginning on May 11, 1959. In the original survey and in other research, (2, 8) it was found that a sizable and apparently growing volume of cartoned eggs is moving from country shipping points to chainstore warehouses in Chicago and other cities. It appeared that a sufficient volume of pricing information would be available for a report, because 39 or more firms in Iowa and Minnesota were packing at least some cartoned as well as wholesale graded eggs. No statistical analysis of this reporting has been made.

5/ For further details on sampling alternative, see appendix, p. 40.

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Figure 4.--Market News reporters at Des Moines gathering egg pricing information, dictating the report, and sending the report over AMS leased teletype.

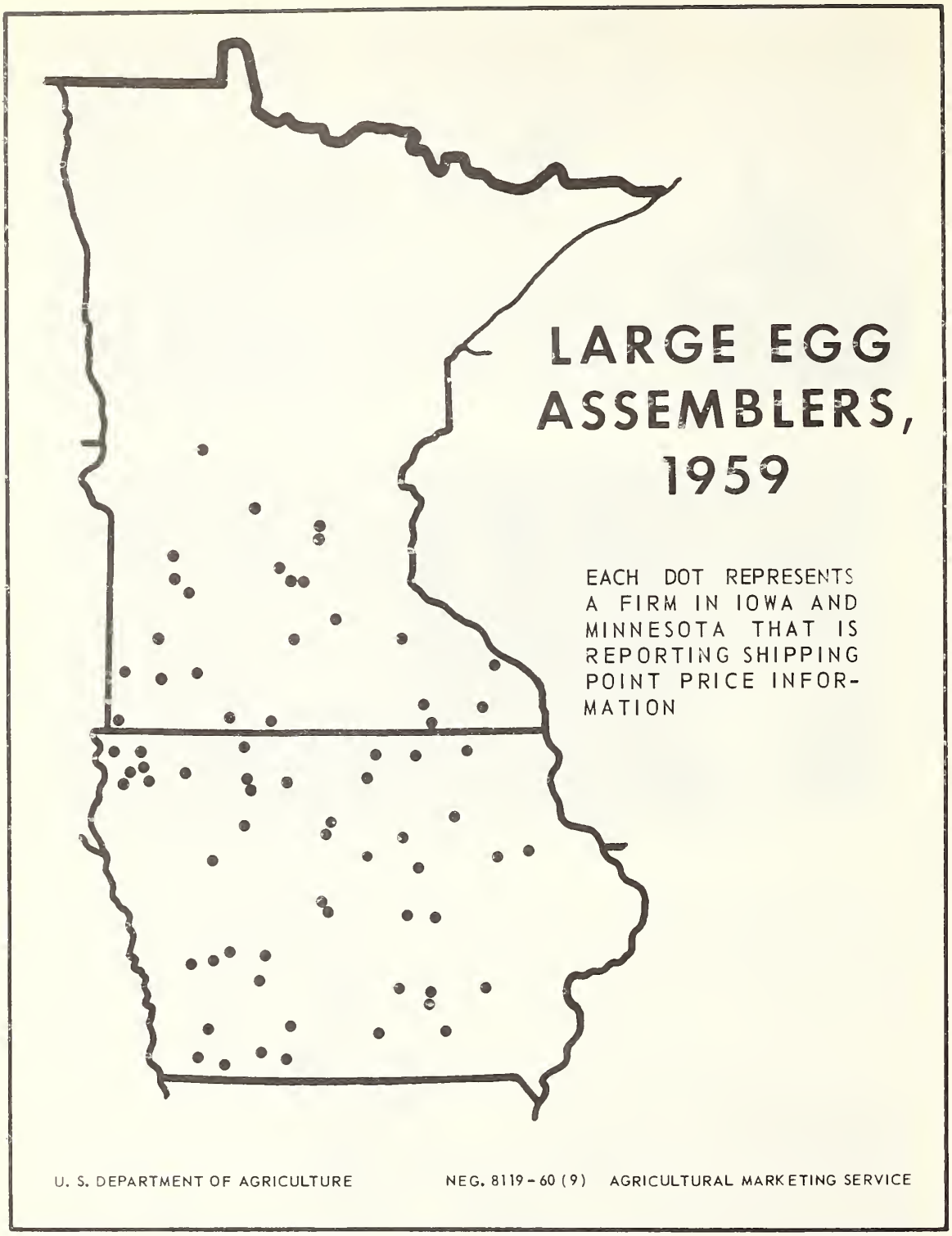

LARGE EGG ASSEMBLERS, 1959
EACH DOT REPRESENTS A FIRM IN IOWA AND MINNESOTA THAT IS REPORTING SHIPPING POINT PRICE INFORMATION
U. S. DEPARTMENT OF AGRICULTURE
NEG. 8119-60 (9) AGRICULTURAL MARKETING SERVICE

Figure 5.--Locations of egg assemblers in Iowa and Minnesota reporting shipping-point price information, 1959

Active participation of the Marketing Research Division in the development of the Iowa-Minnesota Shipping-Point Price Report for Eggs terminated June 30, 1959. By that time, continuing price series, twice a week, had been developed for wholesale packs, cartoned eggs, and breaking stock. An evaluation of the precision, accuracy, and potential usefulness of these series to the egg trade is presented later in this report. A sample price report, for June 15, 1959, is illustrated below:

IOWA-MINNESOTA EGG REPORT

Prices net shippers today (Monday) were generally higher than Thursday with the most advance noted on large loose extras. A few loose mixed color consumer grade A large sold as high as 27 1/2¢. A few large lots of grade A and B large moved to breakers on cases exchanged basis at 7.35. Receipts lighter in sections but no sharp decreases noted. Collections containing higher percentage of lower quality and soiled eggs. Demand from consumer areas continued to improve but these outlets critical of quality. Shippers attempting to clear supplies through breaker and storage outlets at more advantageous prices. Today's reported sales totaled 13,630 cases.

Prices received June 15, by shippers at Iowa-Minn. shipping points in truck lots, for Ex. Min. 80% A, cases included, cents per dozen:

LOOSE:	Lge. Wh. Naturals	1895 cs.	24-27¢ (56% 24; 6% 25 1/2; 26% 26; 3% 26 1/2; 9% 27)
	Lge. Mxd. Naturals	4145 cs.	24-26 1/2¢ (12% 24; 18% 24 1/2; 48% 25; 3% 25 1/2; 19% 26 1/2)
	Med. Mxd. Naturals	300 cs.	19-21 1/2¢ (42% 19; 16% 21; 42% 21 1/2)
CARTONED:	Lge. Wh.	2830 cs.	28 3/4-31 1/2¢ (8% 28 3/4; 4% 29; 40% 29 1/2; 19% 30; 3% 31; 25% 31 1/2)
	Lge. Mxd.	975 cs.	28 3/4-30 1/4¢ (43% 28 3/4; 13% 30; 44% 30 1/4)
	Med. Mxd.	225 cs.	24 1/2-25 1/4¢ (35% 24 1/2; 52% 25; 13% 25 1/4)
	Standards	190 cs.	25 3/4-27 1/4¢ (11% 25 3/4; 63% 26 1/2; 26% 27 1/4)

Prices net shippers on cases exchanged basis for period June 12 and 15, on sales to breakers, dollars per cs.:

Unclassified	2475 cs.	5.85-6.80 (4% 5.85; 5% 6.30; 40% 6.50; 51% 6.80)
Checks	600 cs.	5.55-5.85 (19% 5.55; 15% 5.70; 66% 5.85)

This experimental report is a joint project with the Marketing Research Division, AMS.

USEFULNESS OF THE REPORT

The Iowa-Minnesota Shipping-Point Price Report for Eggs is the first market news report of its kind for eggs. Individual shippers can compare the prices they were able to obtain today with those obtained today by other shippers performing similar marketing functions. Individual buyers in the most distant consuming markets can compare the prices they paid today with those paid today by other buyers on purchases made in the Iowa-Minnesota surplus egg region.

In the spring of 1959, market news reporters surveyed persons on the mailing list for the Atlanta egg market report, and found that 22 percent of the users of that report were interested in following the Iowa-Minnesota report. These people had become interested in the Iowa-Minnesota information even though it had been carried in the Atlanta report only a few months.

The Iowa-Minnesota report helps market news reporters in terminal markets by providing them with check data on prices paid by wholesale receivers and others. This is important to reporters who collect f.o.b. market prices, since they have limited local sources for checking the veracity of the statements of receivers, except by recourse to receivers' records. Relatively small elements of uncertainty of prices paid by individual wholesale receivers may still occur, but they cannot long endure because of the intermarket arbitrage 6/ functions performed by the country-point shippers and the interarea arbitrage of receivers, which tend to adjust intermarket and interfirm price differences to a cost relationship.

The relatively narrow ranges in the net prices received by the Iowa-Minnesota shippers support the hypothesis that important arbitrage functions are performed rather effectively, even in the short run. Although a fairly large proportion of the table eggs are sold under continuing agreements, the uncommitted portion can be sold in one market or another. A large proportion of the sales of breaking stock are uncommitted prior to sale, and thus the eggs are available for sale to a variety of buyers. Verbal reporting of the shifts in the flow of the eggs and in the response of prices to these changes is an important function performed by the Iowa-Minnesota report.

Time Arbitrage

When the egg dealers pack eggs for storage, they have made a decision to hold the eggs from sale in the current market. They are, in effect, performing an arbitrage function between current and future use, or in more technical terms, transforming present time utility into future time utility. 7/ Comments made in the Iowa-Minnesota Shipping-Point Price Report illustrate this point. On June 10, 1958, the report stated, "Production seasonally declining at some points, but supply fully ample for current requirements, and some stocks moved to storage." On June 17, 1958, the report stated, "Packing for storage lighter." Receipts of eggs declined seasonally, and no comments were made on movements into storage until the following spring. On March 26, 1959, the report stated, "Breaker activity heavy, but failed to clear surplus supplies and some

6/ "Arbitrage" has been defined as purchasing in one market for immediate sale in another at a higher price. In the concepts presented here and the sections that follow, the markets and arbitrage functions are viewed in their economic dimensions; that is, the direction of the flow of goods into one end use or into one consuming area, rather than some other, is considered to be intermarket arbitrage.

7/ "Utility" is a term used to describe the value in use of a product. Any change in time, place, or form of sale of the product changes its utility.

shippers packing for storage to avoid accumulations." On March 30, 1959: " . . . many shippers packing for storage." On May 4: " . . . movement through breaker and storage outlets heavy." On June 8: "Moderate volumes also moved into storage . . . " On June 25: "Volume packed for storage sharply reduced." Who made the decisions that caused these shifts is not stated in the comments, but the information is nevertheless useful.

Form Arbitrage

Performing an arbitrage function for the form in which eggs are marketed could involve packing consumer graded and cartoned eggs versus packing wholesale grades "loose" in 30-dozen cases. Only occasional comments can be found in the published reports on this point. The special facilities required for cartoning usually warrant their continuing use if available. Although the volume of eggs that are consumer graded and cartoned at Iowa and Minnesota plants undoubtedly has been increasing in recent years, the shift has been occurring slowly. A recent study (2) shows that worthwhile savings can be made by packing consumer graded and cartoned eggs at country points.

A more obvious illustration of arbitrage between one form of utility and another concerns the increase or decrease in the flow of eggs to breakers. Ample comments on this flow are found in the Iowa-Minnesota report. Although some egg breaking occurs every month, most of it occurs during the spring and early summer, especially in the surplus egg production area of which Iowa and Minnesota are the center. Buying interest or a lack of it on the part of egg breakers has an important influence on shell egg prices both in the Midwest and elsewhere.

The competition for supplies between the terminal markets for table eggs and the breakers for breaking stock is readily apparent in the market reporters' comments. At times, the influence of demand from other outlets is mentioned also.

On February 2, 1959, the report stated, "Subzero temperatures and increasing hatchery requirements reduced market supply . . . . . demand from regular consumer areas improved. Breakers price conscious and currently selective." On February 26: "Demand for graded eggs uneven, but moderate. Breaker interest good and attracting large supply." On March 12: "Receipts . . heavy but contained many eggs accumulated on farms because of snow-blocked roads. Quality adversely affected by delayed marketing. Demand from consumer areas moderate and advance buying for Easter trade fair to good. . . . Breakers bidding lower and generally not aggressive." On April 13: "Demand from consuming centers fair to dull, but shippers clearing inventories through breakers and storage sales at more advantageous prices. Breakers' operations continue at high level . . . " On May 14: "Demand from consumer areas fair to dull with some long-time regular receivers cancelling commitments. Breaking activity heavy and buying interest good at present prices . . . " On May 28: "Breaker activity continued to exert heavy influence on marketing patterns in area with relatively light volume moving to consuming areas." On June 11: "Improved demand from consuming areas not fully satisfied since best returns to shippers received from other outlets." And finally on June 25: "Receipts at assembly points continue to decrease. . . . Demand from consuming areas generally good with emphasis on quality. . . . Breaker interest uneven and becoming price conscious. Some were out of the market, a few indicated their season's operation will end when present backlog is depleted."

The market news reports of these developments during the spring of 1959 certainly were of value to shippers in the area who were seeking the best returns from the alternatives available to them.

Place Arbitrage

When the Iowa-Minnesota egg shippers sell the uncommitted portion of their receipts to buyers in one city or area rather than another, they are performing an intermarket or place arbitrage function. The Iowa-Minnesota report makes specific mention of this type of arbitrage on a few occasions:

On June 5, 1958: "Interest from consumer areas, including the South, improving." On December 4, 1958: "Export and regular outlets absorbed reduced supply of mediums." On December 18, 1958: "Very good demand from consumer areas coupled with substantial volume moving on export commitments readily cleared current shipper supplies." On January 5, 1959: "Pressure of lower priced offerings from West Coast curtailed movement of eggs to southwestern States." On January 15, 1959: "Demand was good and available supplies often short of full requirements, and some orders from southern and eastern points not filled." On May 18, 1959: "Demand from consumer areas only fair, but inquiry from some Southern areas increasing."

Individual shippers are continually seeking to maximize their returns, and one of the most fruitful ways of doing so is to seek the best market outlet they can find. While the market comments cited above indicated a somewhat passive role for egg shippers of simply responding to demands from alternative locations, this passivity may be a function of the lack of information of what alternatives are open to them. Some shippers who negotiate for price and other terms of sale on part or all of their receipts "shop around" for the best deal they can get. When they do so, they are performing intermarket arbitrage functions of time, form, and place.

Market news is especially important to the shippers at such times, because the marketing alternatives are flexible and changing rapidly. Information on supply, demand, and price is needed in arriving at marketing decisions, and individual shippers can obtain it for themselves only at high cost. The summaries prepared by the market news reporters do this job for the shippers impartially and at a lower cost than they could do it individually for themselves.

STATISTICAL ANALYSIS

A criticism frequently leveled at price reporting is that the results obtained do not lend themselves to statistical analysis because it is impossible or, at best, difficult to apply tests of significance or to measure sampling errors. In this research project, a variety of statistical analyses were used to evaluate the alternative estimation procedures available and the efficiency of reporting. However, these statistical methods and results can be used only as guidelines by market news reporters for reporting prices, because of the many daily variables that affect the entire shell egg pricing structure.

Graphic Comparisons of the Iowa-Minnesota Shipping-Point Prices with Those in Other Price Reports

Because the Iowa-Minnesota shipping-point egg prices are related to prices established at New York City and other markets, charts were prepared to make graphic comparisons between some of the price reports. The charts illustrate price relationships between the Iowa-Minnesota shipping-point prices and two price series at New York City, the Market News Service wholesale prices and the Producers' Price Current 8/ prices.

8/ Published by the Urner-Barry Publishing Company, 92 Warren Street, New York, N. Y.

Comparisons are made for the three wholesale grades and sizes of eggs constituting the largest volumes of sales from the Iowa-Minnesota area. The prices plotted are for Mondays and Thursdays because those are the days when the Iowa-Minnesota report was issued, and changes in the New York base price quotations are transmitted to the Iowa-Minnesota shippers within a matter of minutes. The effect of a price change at New York City is reflected in net prices received by shippers within the same day, or even within the same hour, that the change occurs.

Figures 6, 8, and 10 show that the net prices received by Iowa-Minnesota shippers are related to the New York prices, and through time they go up and down together. The Iowa-Minnesota prices, in these figures, are shown as vertical lines to show the full price range, and the crossbars are used to indicate the "mostly" price. From this information, chart analysts may be able to determine if the New York market leads Iowa-Minnesota in price changes or if the reverse situation prevails. Figures 6, 8, and 10 give the first indication of the relationships between the price series and of the variability in egg prices, both on a given date and over time.

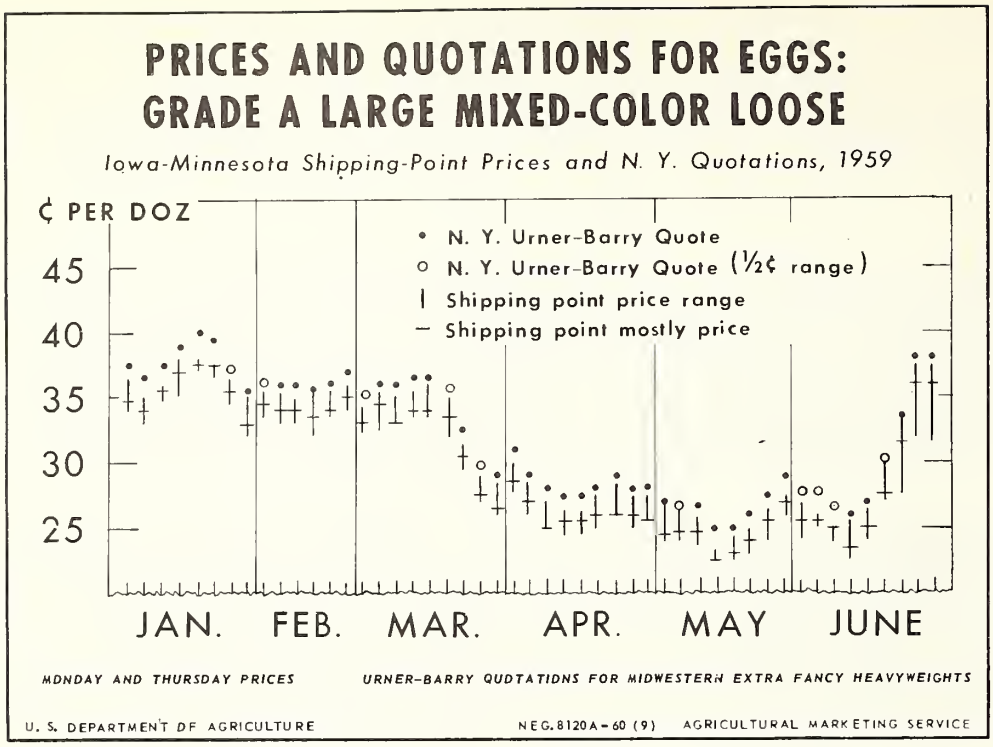
A second graphic approach is to compare the differences between the price series by using the New York price quotations as a base or zero line. This technique also reveals differences between the various series that are not readily apparent when the first group of charts is used alone. In figures 7, 9, and 11, the midpoint of the range of market news wholesale prices at New York for all 3 packs of eggs typically is above the base price quotation, and the Iowa-Minnesota "mostly" price is below it. 9/ Although these charts show the general relationship among the price series, they also show that there is day-to-day, seasonal, and possibly other kinds of variation. The variations between the series may be an indication of the intermarket arbitrage functions performed by some of the shippers, the results of negotiation of price differentials or other conditions of sales, the effects of extreme weather conditions in supply areas, or shifts in the demand for table eggs, egg products, or eggs packed for storage. They may also be indications of sampling errors or other essentially random variations.

Since transportation costs between Iowa-Minnesota shipping points and New York City are about 3 cents a dozen, one would expect this cost to be reflected in the differences between shipping point and wholesale market prices. When the differentials in figures 7, 9, and 11 were averaged for 1959, it was found that they approximated the transportation costs for Grade A large mixed colors and Grade A large white eggs, but for Grade A medium mixed colors the differential was about 1/2 cent a dozen less than transportation costs (table 1). These comparisons are between net prices received by Iowa-Minnesota shippers and wholesale market prices--both are market news price series. For all three packs of eggs, the base price quotations at New York City reflected price differentials that averaged about 2 cents a dozen above the Iowa-Minnesota shipping-point prices.

The fact that the base price quotation does not reflect full transportation costs above net prices received by Iowa-Minnesota shippers may be interpreted in at least two ways.

One interpretation is that the base price quotation is simply a basis used by buyers and sellers to arrive at actual settling prices. In this view, the marketing level reflected in the base price is unimportant so long as it is a level that is fixed over time, because the base price is merely a mechanism to facilitate price change over time. Like a barometer that changes in response to changes in air pressure, the base price quotation should change in response to changes in the supply of and demand for eggs.

9/ A test of 20 percent of the 1959 Iowa-Minnesota prices for Grade A large mixed colors showed a correlation of $r = .999$ between the "mostly" prices and the weighted average prices.


PRICES AND QUOTATIONS FOR EGGS:
GRADE A LARGE MIXED-COLOR LOOSE
Iowa-Minnesota Shipping-Point Prices and N. Y. Quotations, 1959
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• N. Y. Urner-Barry Quote
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| Shipping point price range
— Shipping point mostly price
JAN. FEB. MAR. APR. MAY JUNE
MONDAY AND THURSDAY PRICES
URNER-BARRY QUOTATIONS FOR MIDWESTERN EXTRA FANCY HEAVYWEIGHTS
U. S. DEPARTMENT OF AGRICULTURE
NEG. 8120A-60 (9) AGRICULTURAL MARKETING SERVICE

Figure 6a

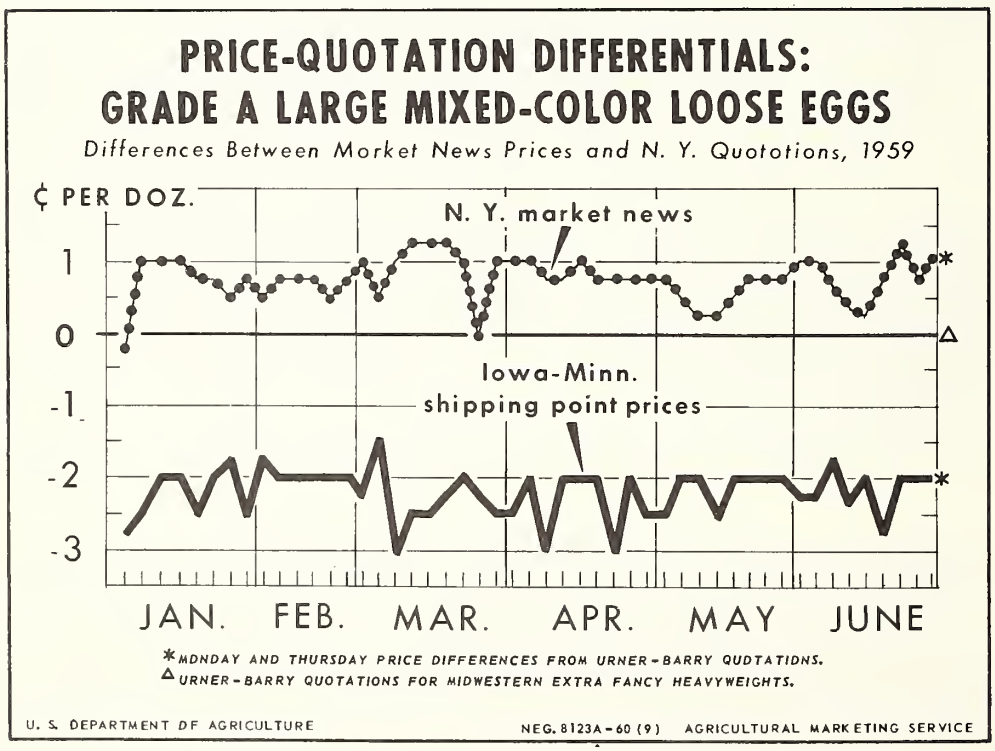
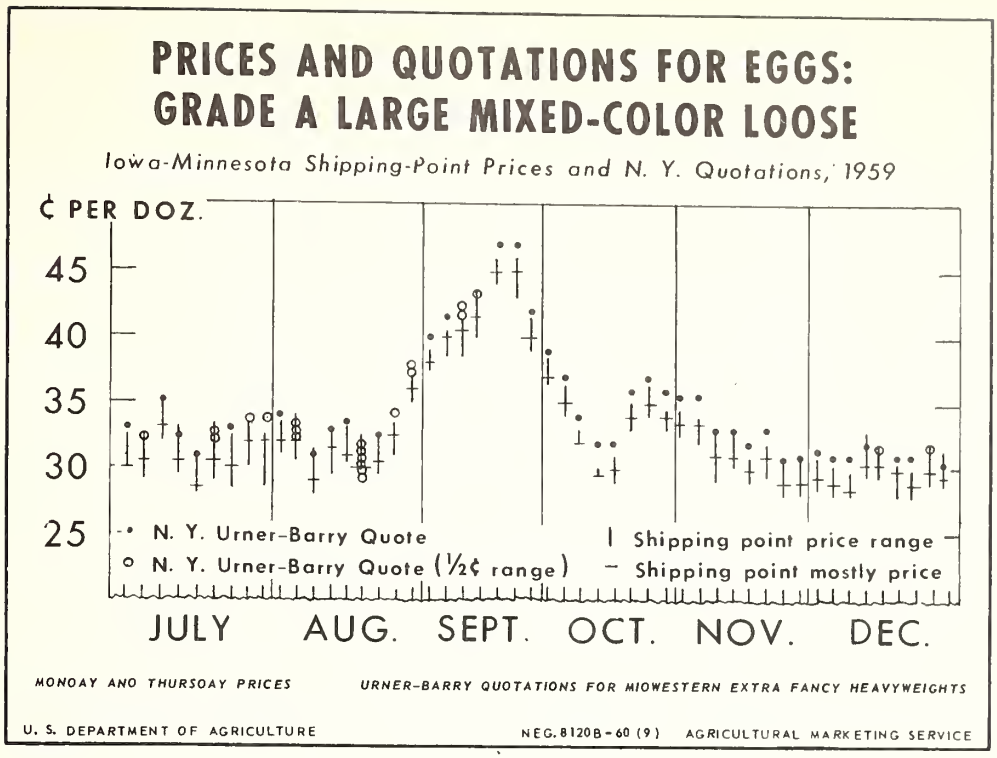


Figure 7a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Shipping point price range
Shipping point mostly price
JULY AUG. SEPT. OCT. NOV. DEC.
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URNER-BARRY QUOTATIONS FOR MIDWESTERN EXTRA FANCY HEAVYWEIGHTS
U. S. DEPARTMENT OF AGRICULTURE
NEG. 8120B-60 (9) AGRICULTURAL MARKETING SERVICE

Figure 6b

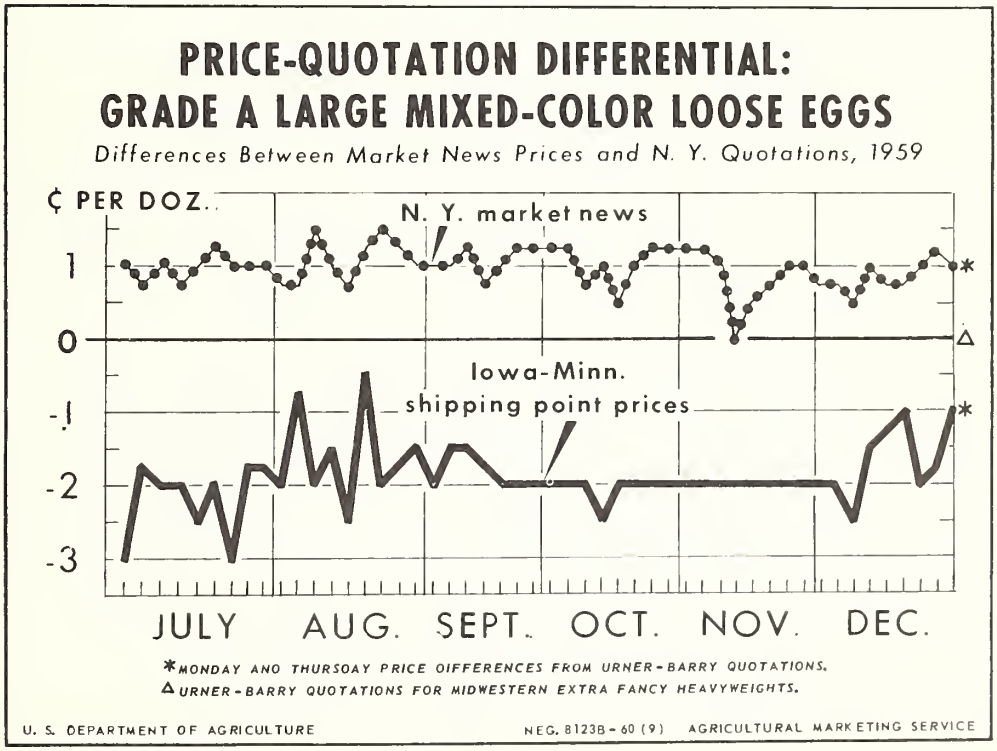

Figure 7b

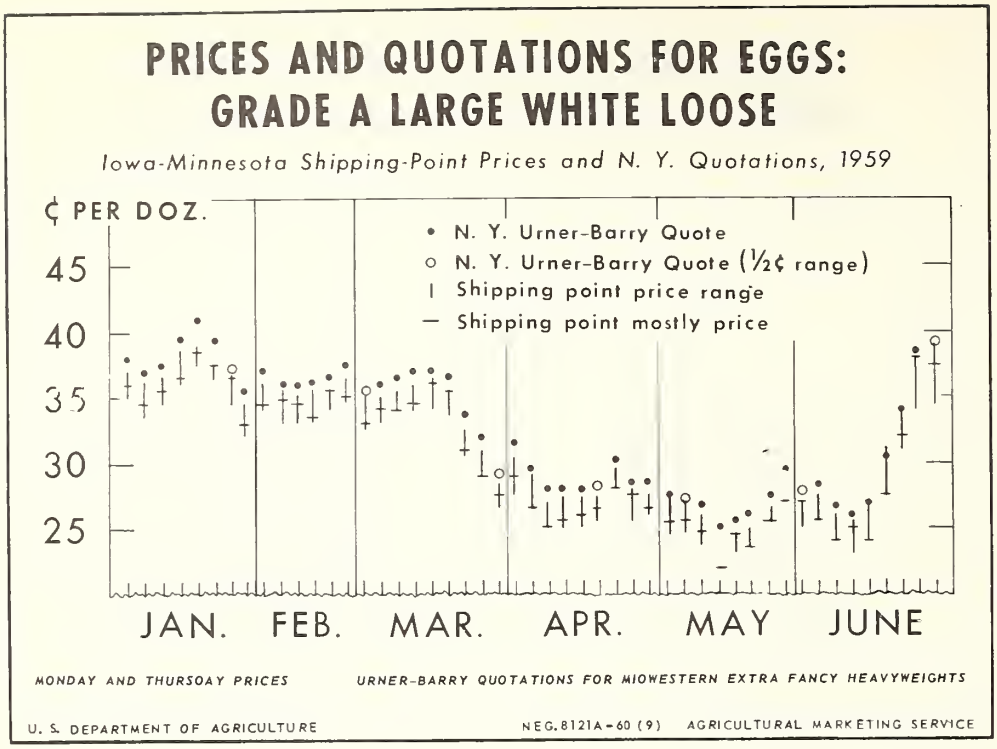
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Figure 8a

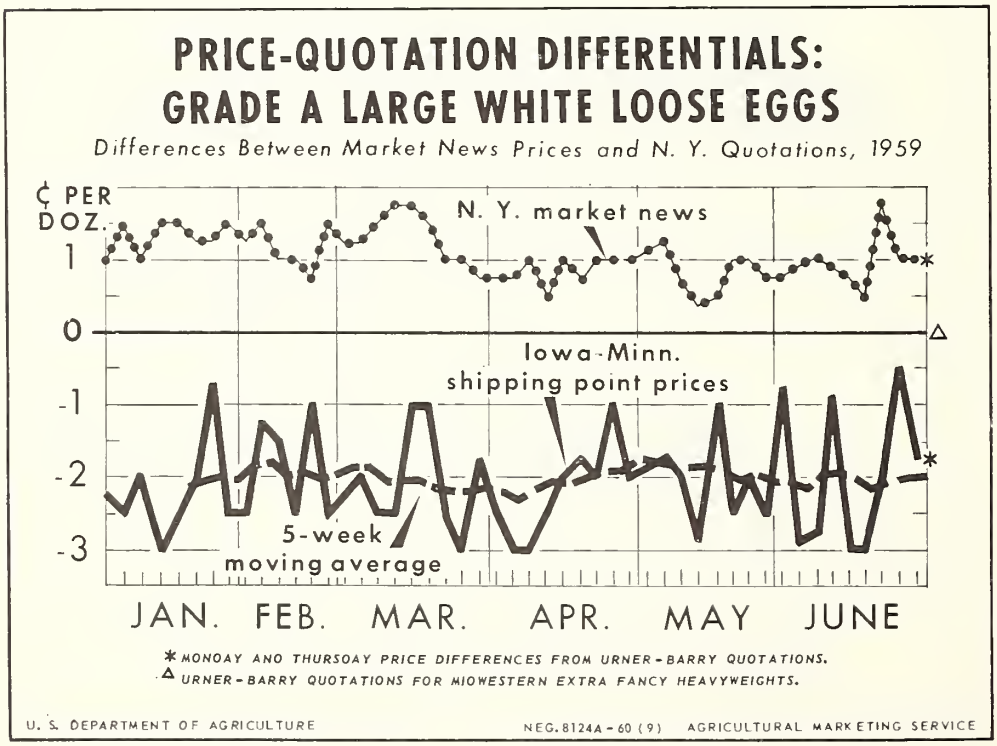
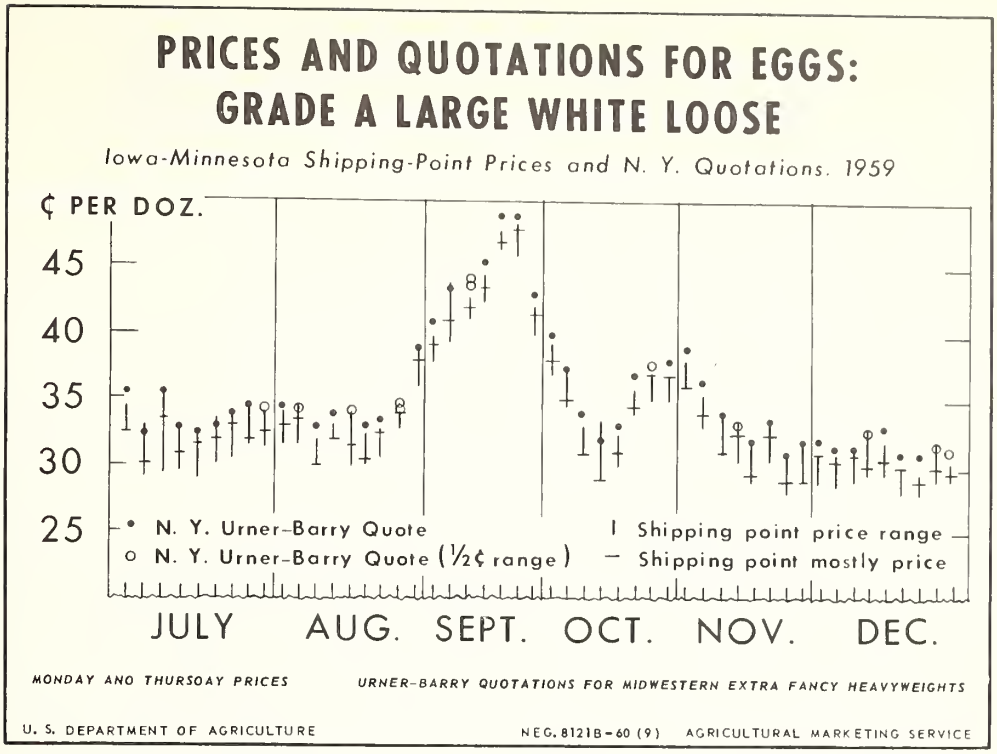


Figure 9a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U. S. DEPARTMENT OF AGRICULTURE
NEG. 8121B-60 (9) AGRICULTURAL MARKETING SERVICE

Figure 8b

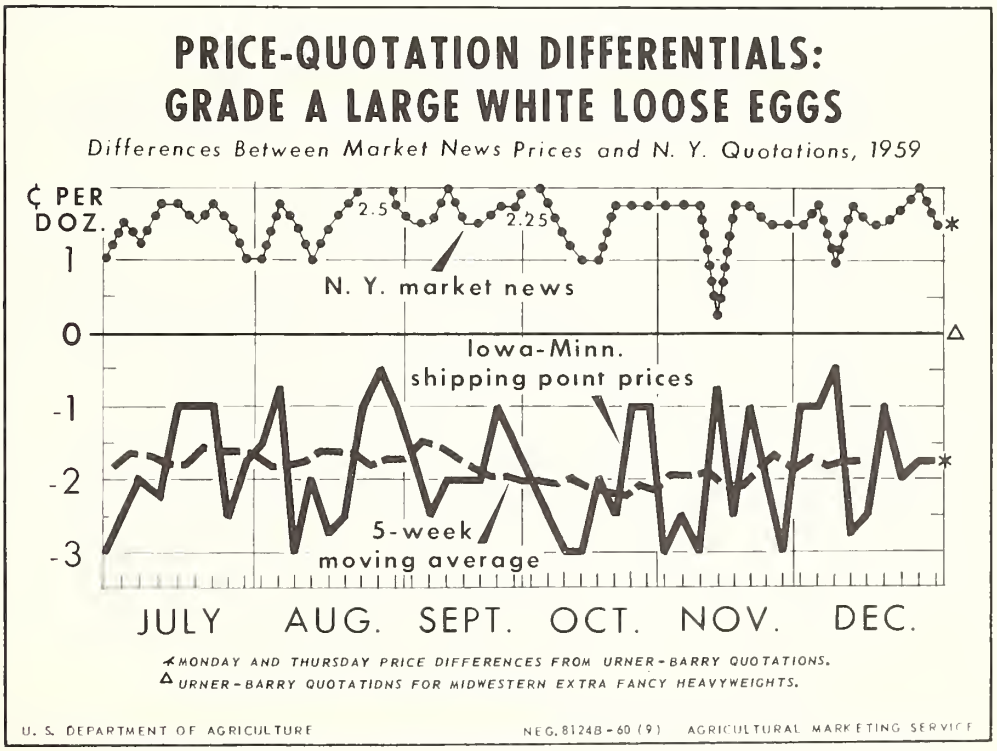


Figure 9b

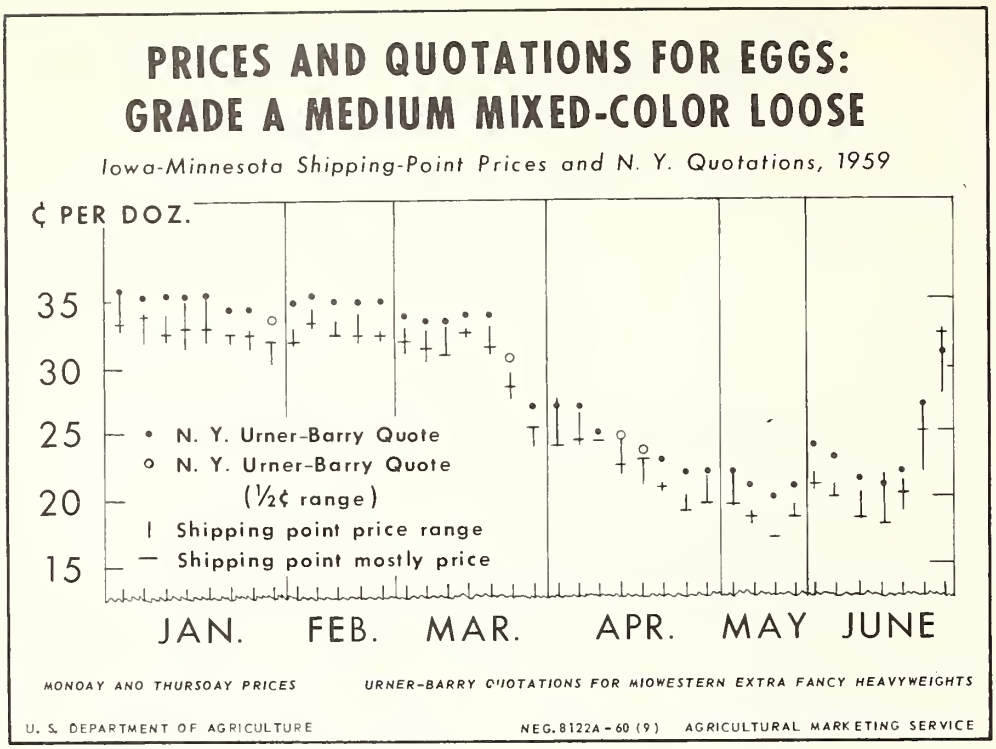


Figure 10a

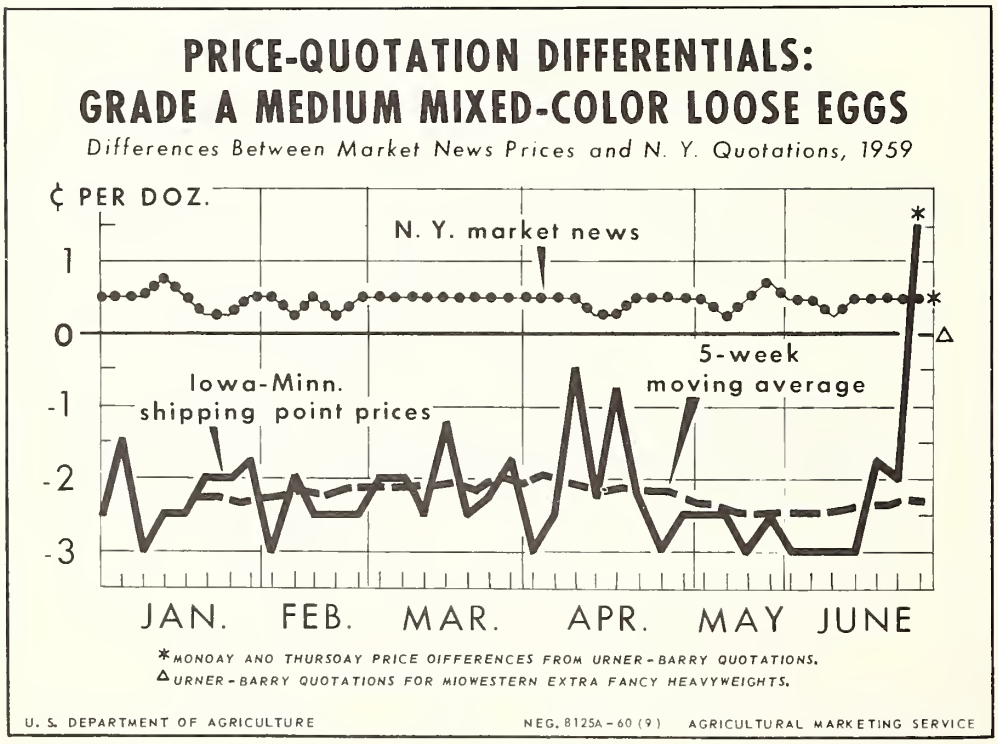
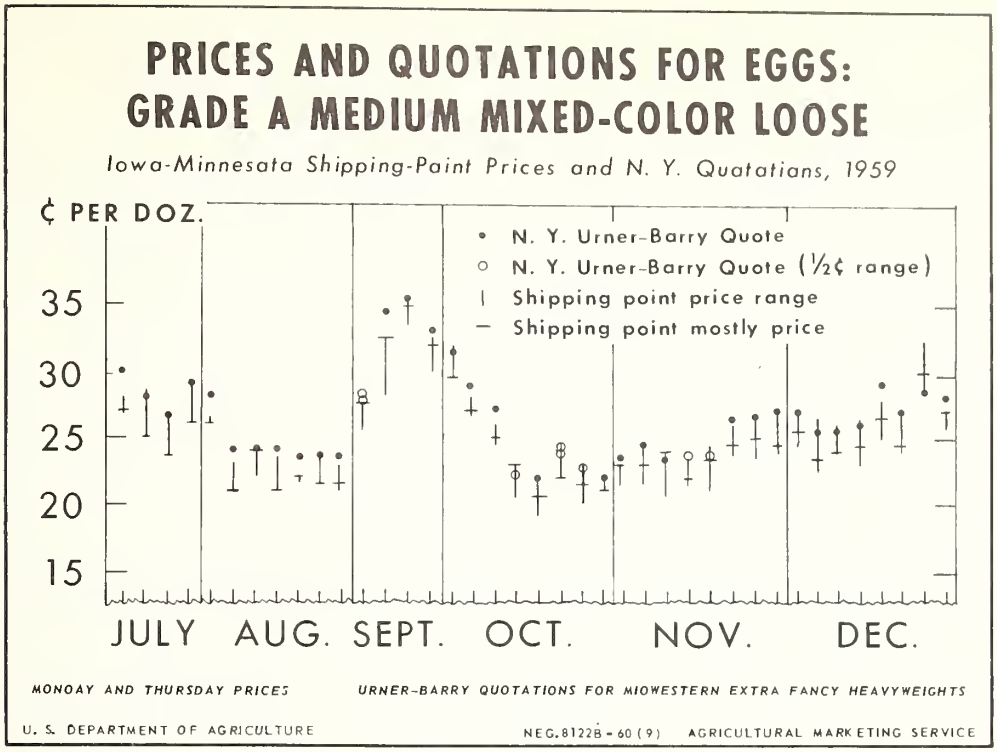


Figure 11a


PRICES AND QUOTATIONS FOR EGGS:
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NEG. 8122B - 60 (9) AGRICULTURAL MARKETING SERVICE

Figure 10b

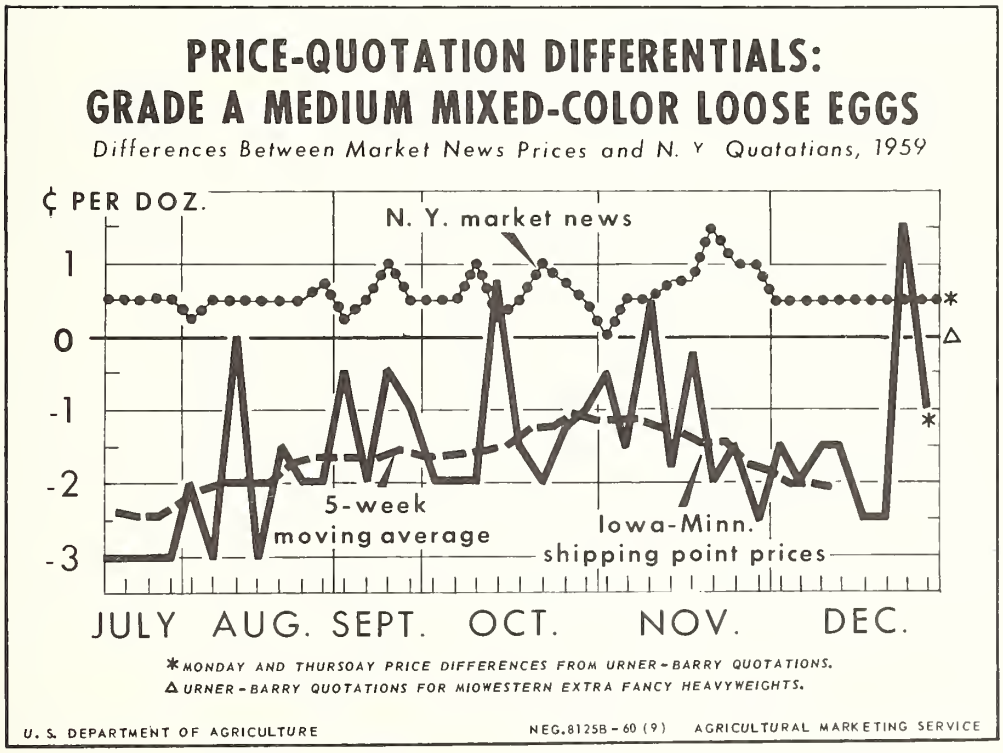

Figure 11b

Actual settling prices between buyers and sellers vary around, above, or below the base price, depending upon numerous factors such as trading level, egg quality, packaging, size of lot, marketing services, bargaining position, and risk assumption.

A second interpretation often heard is that the base price quotation should fully reflect the "true" value of eggs at New York City, and it is not doing so because it is consistently "underquoting" the market. This is one of the complaints most often voiced by those who criticize the base price quotation system. However, it should be kept in mind that the average differentials (table 1) are not averages for all eggs priced at New York City. Eggs from other States and from shippers in Iowa and Minnesota not cooperating in reporting prices are usually priced on these quotations also.

It was not the purpose of this research to examine the merits of the two interpretations of the facts. Rather, the purpose was to present the facts, since this is the first time it has been possible to compare net prices received by Iowa-Minnesota trucklot shippers with market prices at New York City.

Table 1.--Egg price differentials: Differences between three price series in New York City and the Iowa-Minnesota Shipping-Point Price Report, averages, Monday and Thursday, 1959

Series compared	Grade A large mixed colored loose eggs	Grade A large white loose eggs	Grade A medium mixed colored loose eggs
	Cents/dozen	Cents/dozen	Cents/dozen
N. Y. market news midpoint price over N. Y. Urner-Barry	0.86	1.31	0.53
Iowa-Minnesota "mostly" price under N. Y. Urner-Barry . . .	2.04	1.97	1.89
Iowa-Minnesota "mostly" under N. Y. market news midpoint prices	2.90	3.28	2.42

APPENDIX

Analysis of the Iowa-Minnesota Price Reports in 1959

From a statistical point of view, the information collected by the market news service reporters is subject to error in response, sampling, and bias. The bias is from two sources, (1) the natural inclination for sellers either to overstate prices received in the hope that this will raise future prices received, or to understate to fool their suppliers; and (2) selection of larger traders as the principal price-reporting contacts.

One of the problems encountered in assessing the day-to-day variability of the net shipping-point "mostly" prices, both in general and in their usual relationship to the New York base price quotations and other series, is the variation in number of sales for which information was obtained in 1959 (table 2). A second problem is that the statistical universe changes from day to day and is never precisely known. A third problem is that the reporters began in 1959 to enumerate completely, for each report issued, a specifically defined subuniverse of egg shippers. It consisted of all firms in the two States known to be handling 1,000 or more cases per week and willing to cooperate. Thus, the reporters had complete confidence, aside from response and bias problems, in the prices reported for the statistical universe. Nonetheless, not all firms of this size in the area are included; not all have agreed to cooperate on a continuing basis; nor do all of those in the subuniverse cooperate or have sales to report every day. In effect, the reporters are still sampling in a nonspecified fashion. Within the statistical universe, there is variability at any given time. Randomness in occurrence of sales and in providing data on such sales to the reporters give a sampling implication to the operation. The statistical analyses that follow assume randomness.

Table 2.--Number of cases of eggs and number of lots going into reports of net shipping-point prices for the Iowa-Minnesota area, 1959

Grade and size classification	Number of cases 1/		Average number of lots 2/	
	Average	Range	Monday	Thursday
Grade A large mixed	5,761	1,350-14,400	18.16	8.75
Grade A large white	3,149	1,000- 9,570	13.25	8.00
Grade A medium mixed	1,082	150- 5,000	10.25	N. A.

N. A. - Not ascertained.

1/ Based on all reports for 1959.

2/ Based on samples of records kept by the reporters. The samples were selected on a sequential basis, every fifth reporting date being chosen. There were only very minor and nonsignificant differences within grades between Mondays and Thursdays in average number of cases per lot.

The "mostly" prices computed from the market news service reports issued from Des Moines for 1959 were somewhat more variable than were the prices reported at New York and Chicago by either the market news service or the commercial reporting agencies. Day-to-day price changes also were more variable (table 3). The purpose of the following analyses is to assess the extent to which this greater variation may be due to (1) seasonal changes in the Iowa-Minnesota "mostly" prices; (2) shorter-run systematic changes; and (3) random change, composed of sampling error, differences between classifications in seasonal and trend effects, and so on.

Table 3.--Variability (s^2) of prices per dozen reported in 5 different series for Grade A large mixed loose eggs, by days of the week, 1959

Series	Prices			Price changes 2/
	Monday	Thursday	Biweekly 1/	
	Cents	Cents	Cents	Cents
Quotations:				
Urner-Barry Company	21.08	21.60	21.14	3.5924
Market News Survey	20.32	20.26	20.08	2.9310
Market News Service:				
New York (midpoint)	21.99	22.74	22.10	3.8594
Chicago (midpoint)	21.07	22.92	21.77	2.9575
Iowa-Minnesota (mostly)	33.13	22.63	27.57	3.9513

1/ Monday and Thursday.

2/ s^2 of day-to-day price change. 90.2 percent of day-to-day changes in the Iowa-Minnesota "mostly" prices were directly related to day-to-day changes in the Urner-Barry company quotations for mixed fancy heavyweight eggs. By comparison, 94.9 percent of the day-to-day change in the New York market news service prices were associated with the Urner-Barry series.

Seasonal and trend influences affecting the Iowa-Minnesota "mostly" prices were largely removed by subtracting them from appropriate base prices. These computations yielded three sets of differentials (Grade A large mixed loose, Grade A large white loose, and Grade A medium mixed loose), which were then analyzed from several different viewpoints. The variability (s^2) of these differentials was less than 0.5 cent per dozen (table 4) as contrasted to the variability of more than 27.5 cents in the original series (table 3). Further, it is improbable that sampling error alone contributed to the variability of these differentials, the distribution of the differentials being both more positively skewed and more extended on both sides of the average than could be expected from chance alone (0.001 probability level, table 4).

The first possibility to be examined is that subtraction of the "mostly" prices from appropriate base prices did not remove all seasonal and trend influences. Moving averages of the "mostly" price differentials were computed, and these showed evidence of seasonal influences (figs. 7, 9, and 11).

The average differentials on Grade A large mixed color wholesale packs declined from the first to the second quarter of 1959. This decline was significantly larger than could be expected by chance (only 3 out of 10,000 by chance would be as great). However, the estimated decline was not large, only 0.25 cent. There was a further decline of 0.005 cent from the second to the third quarter, and a significant increase of 0.29 cent in the fourth quarter to about the same level as held in the first quarter, -2.13 cents. Detecting such small seasonal changes from a series of semiweekly price reports covering a highly variable universe is very difficult unless the reporters aid their public by reporting moving averages or by commenting upon changes in the moving averages of net price differentials as such.

Grade A large white eggs climbed from about 2.00 cents below the quotations in the first half of the year to about 1.70 cents below in the third quarter, and then dropped back to about 2.00 cents in the last quarter. These changes also were significant. Changes for Grade A medium mixed color naturals were significant both statistically and from an economic viewpoint. The season average differential on mediums went

from about 2.5 cents below the base price quotation in the early part of the year up to about 1 cent below in the summer. No analysis has been made of the causes of this change, but shifts from a New York pricing basis to a Chicago basis, shifts from small units of sale to more nearly trucklot units, and other factors may account for them. Changes of such magnitude may reflect variation in the confidence of the buyers and sellers of Midwestern eggs in the ability of the base price at New York to reflect values adequately in the Midwest. Chicago or other markets may become more important than New York during such periods.

These seasonal changes in differentials go far in explaining the greater variability in the Iowa-Minnesota "mostly" price series shown in table 3 than were found in New York and Chicago price series. The differentials tended to be small when prices were seasonally high and tended to be larger when prices were seasonally low. Thus, the seasonal price cycle, as it is called, was more severe in net prices to Iowa-Minnesota shippers than it was at New York and Chicago. The relatively short period of high prices and small differentials, coupled with the limiting effect at minus 3 cents produced by the New York base price minus transportation, explain to some extent the abnormal skewness noted in the distribution of the "mostly" price differentials (table 4). The changes in differentials seasonally explain the flatness noted.

Table 4.--Distribution of sales of shell eggs by Iowa-Minnesota shippers by differentials of net "mostly" prices from Urner-Barry company quotations, for three table egg grades, 1959 1/

"Mostly" price differential	Reports			Cases of eggs		
Cents	Number	Percent	Accumulated percent	Number	Percent	Accumulated percent
- 3.00	35	13.7	13.7	70,731	7.6	7.6
- 2.75	5	2.0	15.7	20,877	2.3	9.9
- 2.50	48	18.8	34.5	177,073	19.1	29.0
- 2.25	10	3.9	38.4	37,882	4.1	33.1
- 2.00	83	32.5	70.9	377,969	40.8	73.9
- 1.75	18	7.1	78.0	80,942	8.7	82.6
- 1.50	17	6.7	84.7	60,984	6.6	89.2
- 1.25	3	1.2	85.9	9,648	1.0	90.2
- 1.00	19	7.5	93.4	54,847	5.9	96.1
- 0.75	7	2.7	96.1	14,915	1.6	97.7
- 0.50	7	2.7	98.8	13,419	1.4	99.1
- 0.25	1	.4	99.2	4,209	.5	99.6
0.00	1	.4	99.6	267	2/	99.6
+ 0.25	0	.0	99.6	0	.0	99.6
+ 0.50	1	.4	100.0	3,349	.4	100.0
Total	255			927,112		

1/ Standard deviation of "mostly" price differentials = 0.6769, average = -2.0216. This standard deviation cannot be considered as another estimate of daily standard errors because it includes seasonal trends in level of differential structures and varying numbers of lots per report. $g_1 = 0.5824$, $Sg_1 = 0.526$, $t_1 = 3.8165$, significant at 0.001 probability level; thus, positive skewness is present. $g_2 = 2.6776$, $Sg_2 = 0.3038$, $t_2 = 8.8136$, significant at 0.001 probability level; thus, the distribution is flatter than normal.

2/ Less than 0.05 percent.

Another possible cause for variation in differentials is short-run changes in supply and demand conditions for eggs that follow somewhat the short-run cycle pattern described by the prices shown in figures 6, 8, and 10. However, examination of the deviations of Iowa-Minnesota "mostly" price differentials from appropriate moving averages of the differentials revealed no systematic patterns. Thus, aside from seasonal patterns in differentials, the time sequence was random. The remaining analyses are devoted to explaining, insofar as possible with available data, the causes of the variability remaining in the deviations of "mostly" price differentials from appropriate moving averages.

The moving average relationships for Grade A large white eggs stayed closer to 2 cents year-round than did those for the other 2 grades (figs. 7, 9, and 11). Thus, it might be expected that prices reported for this grade were usually close to 2 cents under base prices. Data in table 5 show that only 55 of the 99 observations on "mostly" prices of Grade A large white loose eggs fell in the range of 2.00 plus or minus 0.5 cent, whereas 87 of the 99 observations for Grade A large mixed color fell in this range. These tabulations indicate the relationship of the number of cases sold, as learned by the reporters, to the deviations of the "mostly" prices shown in table 5. Grade A large mixed had both larger lots and more lots per report than did the other two grades.

Table 5.--Relation of the net "mostly" prices reported for Iowa-Minnesota shippers of shell eggs to the quotations of the Urner-Barry company, three major categories, 1959 1/

Urner-Barry minus net prices	Wholesale packs			
	Grade A large mixed	Grade A large white	Grade A medium mixed	Total
Cents per dozen	No. of days	No. of days	No. of days	No. of days
2.00	50	19	16	85
1.75 and 2.25	14	11	7	32
1.50 and 2.50	21	25	24	70
1.25 and 2.75	3	4	2	9
1.00 and 3.00	7	33	18	58
0.75	1	4	1	6
0.50, 0.25, 0, and -0.50	1	3	10	14
Total	97	99	78	274

1/ These distributions as measured by chi square are significantly different. The modal figure of 2.00 is very close to the average for each of the 3 grades, and is used for convenience in the text.

It appears that little support can be given to statements that the daily net price reports "prove" that the overall differential structure varies widely from day to day. It would have been expected about 95 percent of the time to estimate average price differentials within plus or minus 1/2 cent of the "true" differentials, if information on 12 or more randomly selected lots were obtained (see appendix, page 42). It was found that when the volume was up to 5,000 or more cases, the "mostly" price differentials were 2 cents plus or minus 1/2 cent almost 90 percent of the time (table 6). This leaves little room for great variation day to day in "true" differentials. On those reports when the "mostly" price differentials were 2.0 cents plus or minus 0.5 cent,

the number of cases reported was 2,500 or more in 67 percent of the instances. On those 78 reports when the differentials were outside this range, only 38 percent were based on 2,500 or more cases. On none of those 17 reports when the differentials were less than 1 cent below the quotation (or the net price was actually above it) were as many as 5,000 cases reported.

Table 6.--Relationship of number of cases in each report to magnitude of differential between the Iowa-Minnesota "mostly" prices and the Urner-Barry quotations, three grades combined, 1959

Cases per report	"Mostly" price differential 1/					Total reports	Between 1.50 and 2.50 cents	Deviation 2/
	2.00	1.75 and 2.25	1.50 and 2.50	1.00, 1.25, 2.75, and 3.00	0.75 and less			
	Number of reports						Percent	Cents
1-2,499	26	9	24	39	9	107	59	0.61
2,500-4,999	25	14	23	15	8	85	73	.49
5,000-7,499	14	3	12	4	0	33	88	.32
7,500 and up	18	5	4	3	0	30	90	.20
Total reports	83	31	63	61	17	255	69	.49
Percent 2,500 or more	69	71	61	36	47	58	---	---
Average cases per report	4,849	3,992	3,599	2,610	2,368	3,617	---	---

1/ Urner-Barry quotation minus Iowa-Minnesota "mostly" price, cents per dozen.
2/ Average of the deviations around 2.00 cents.

However, the data in table 6 are not ideal for a test of relationship of volume of sales availability for reporting day-to-day variation in differentials. Those data are not corrected for differences in average size of lots between grades or for seasonal variations in the differentials. A second test of the data was provided by relating deviations of the "mostly" price differentials from the 5-week moving averages (separately for each grade) to the number of cases involved. The volumes were then divided into 7 size groups for each grade, and an analysis of variance of the 240 observations on price deviations was made to separate out the major sources of variation (table 7). The procedure in effect "corrects" the data for the difference in average lot sizes of the three grades and in different seasonal patterns of differentials for the three grades. After taking account of the different average size of lots for the different grades, and of the different seasonal patterns in differentials, this analysis shows that the numbers of cases going to make up the price reports were still very strongly related to the deviations of the "mostly" price differentials from the 5-week moving averages of the differentials. While no causal relationship can be proved, these findings do suggest that the small number of cases reported on some occasions resulted in essentially random locations of the daily "mostly" price differentials within what may well have been a structure of differentials that was stable from day to day except for seasonal trends. Earlier analysis of the deviations from the moving averages for turning points and runs showed that the day-to-day changes were not significantly different from those of a random series.

Table 7.--Analysis of variation in "mostly" price deviations from 5-week moving average prices, three grades, 1959 1/

Source of variation	Degrees of freedom	Sums of squares	Mean squares	f ratios
Between grades 2/	2	6.7671	3.3836	21.20**
Between number of cases in grades 3/	13	28.9851	2.2296	13.97**
Residual	224	35.7522	.1596	---
Total	239	78.5000	---	---

**F-ratios of this magnitude have less than 1/100 chances of occurring in analyses of groups drawn randomly from a homogeneous population.

1/ Deviations of "mostly" price differentials from 5-week moving averages of differentials for each grade were sorted by number of cases going into individual reports. There were 7 breaks allowed in number of cases per report: Less than 500 cases, 500-999, 1,000-1,749, 1,750-2,499, 2,500-4,999, 5,000-7,499, and 7,500 or more. However, 5 of the 21 possible cells had no observations, leaving a total of 16 cells among the 3 grades.

2/ Differences in both average numbers of cases per lot and average number of lots per day between grades were significant and are reflected in this source to some degree (see table 3).

3/ As can be seen, this factor accounts for 4 times as much of the variations in deviations as does the grades factor. Together, they account for 50 percent of all of the variation. There was a consistent inverse relationship between deviations and volume of eggs for reporting. Regression between average deviation and average number of cases for the 7 groupings explained 95.7 percent of the variation in average deviations, the regression coefficient being -0.04 cent per 1,000 cases.

Since Grade A large mixed color is the category for which reported sales were largest, the findings suggest that the numbers of lots for Grade A large white, Grade A medium mixed, and other grades were often insufficient in 1959 for the desired precision levels of 0.5 cent 95 percent of the time, and may be insufficient on Thursdays even for Grade A large mixed. The confidence limits for Grade A large mixed for average conditions would appear to be less than the 0.5 cent only on Mondays, for the hypothetical ranges of the universes (table 8). However, these limits are computed on the assumption that the procedures followed in 1959 can be interpreted as truly random samplings from a fixed universe with a variance of 1.1666 cents per dozen (see appendix, p. 41). This assumption cannot be verified with the data at hand, nor can any alternative assumption be developed without a large amount of computation and further data collection. Consequently, the confidence limits in table 8 are simply suggestive of what the true situation might have been.

The analysis of the price reports thus supports the following conclusion: Day-to-day changes in the level of the structure of differentials cannot be distinguished in the 1959 daily reports of Iowa-Minnesota net shipping-point prices. Sampling variation, or, alternatively, "universe" variation, from day-to-day was so large relative to day-to-day changes in the level of the differential structures that the sources of variation could not be distinguished daily.

This conclusion should not be interpreted to mean that this reporting venture added nothing to the information available from terminal market price reports. On the contrary, aside from questions of the relative efficiency of obtaining various measures of

day-to-day change in basic national price levels, the Iowa-Minnesota reports are of current value to shippers and to receivers. As discussed earlier, the range of prices reported on any one day represents in some degree imperfection of knowledge. By comparing his position in the reported range on a given day or over time, a shipper or receiver may learn that he is receiving or paying relatively unfavorable differentials. Armed with this knowledge, he may then seek better alternatives, or come to recognize some aspect of his operation that causes his position to be relatively unfavorable. He may find that the limiting factor in his operation can be eliminated at a cost somewhat less than the added returns others are achieving. Whether the serving of this function would be best performed by outright reporting of price differentials from base prices, by moving averages of recent data collections, or the current method of reporting absolute price levels daily is open to question. Most firms seem to think in terms of differentials. Further, the daily comments on marketing conditions should be quite useful to shippers and others.

Table 8.--Confidence limits 1/ for the 3 grades of eggs under the average conditions reported in table 2, cents per dozen

Grade and size classification	Monday			Thursday		
	N = 150	N = 100	N = 60	N = 75	N = 50	N = 25
	Cts./doz.	Cts./doz.	Cts./doz.	Cts./doz.	Cts./doz.	Cts./doz.
Grade A large mixed	0.502	0.484	0.447	0.764	0.737	0.651
Grade A large white	.618	.603	.573	.832	.807	.726
Grade A medium mixed	.735	.722	.695	---	---	---

1/ $d = \sqrt{\frac{t^2 s^2}{n}}$ where s^2 is adjusted for universe size.

Sample of Iowa Egg Handlers Selected for Survey of Shell Egg Shippers' Pricing Practices

The selection of a sample of Iowa egg handlers, for purposes of determining pricing practices, was materially benefited by information available from research project OC 3-6, "Improving market information reporting of egg and poultry movements through assembling and processing plants."

During the summer and fall of 1956, a mail survey was conducted of a stratified sample of licensed egg handlers in Iowa. The results of that survey are summarized in table 9. Analysis of the data obtained showed the original classification of the firms was reasonably accurate (tables not shown).

The 524 usable questionnaires received were ranked according to volume of eggs handled and the frequency distributions are shown in table 10. The definition of the statistical universe for the survey of egg pricing practices and the estimate of the number of firms in the universe were prepared from these tables. The statistical universe has been defined as "the firms that produce or buy eggs from producers or other small-volume assemblers; who sell at least a truckload (500 cases or more) per week, on an annual average basis, and who predominately handle eggs that are destined for distributive outlets or egg breakers." An estimate was made that there were 170 of these firms in this universe in Iowa.

Table 9.--Summary of mail survey of licensed egg handlers in Iowa, 1956

Item	Size group 1	Size group 2	Size group 3	Size group 4	Total
Licensed egg handlers, original classification:					
a. Cases handled per week in April	Less than 30	30-59	60-249	250 and over	---
b. Firms - number	876	238	472	338	1,924
Sampling rate - percent	25	50	100	100	---
Questionnaires sent out - number	219	119	472	338	1,148
Returns, all:					
a. First mailing - number	75	34	157	146	412
b. Second mailing - number	65	35	134	77	311
c. Third mailing - number	29	17	34	38	118
Total	169	86	325	261	841
d. Percentage response	77.2	72.3	68.9	77.2	73.3
Usable returns:					
a. First mailing - number	40	16	100	114	270
b. Second mailing - number	28	18	90	55	191
c. Third mailing - number	10	8	20	25	63
Total	78	42	210	194	524
d. Percentage response	35.6	35.3	44.5	57.4	45.6

In developing the sampling plan for selecting firms to be interviewed, primary consideration was given to size of firm. The hypothesis advanced was that the large firms are the ones most likely to engage in pricing practices of the kind about which information is desired. A corollary is that the firms handling relatively small amounts, less than truckload lots (500 cases) per week, are probably selling to local outlets or to large firms that can ship out a truckload a week. A truckload of 500-600 cases of eggs apparently was the minimum economic unit for long-distance transportation.

Strata 1 through 4 were selected on the basis of size. Stratum 1 consists of all firms handling 1,000 cases or more per week, and all firms were included in the sample except the plants of integrated firms. Stratum 2 consists of the firms handling 500 to 1,000 cases per week. A 50 percent random sample of this stratum was chosen. Stratum 3 consists of those firms handling 200-499 cases per week. A 10 percent random sample was chosen to test the corollary to the hypothesis, that is, that the small firms sell to the large firms and their pricing results are dependent upon the actions of the large firms. Stratum 4 consists of the firms handling 1-199 cases per week. None of these firms was included because there is ample evidence on questionnaires received from firms in this size group, under Project OC 3-6, that they are buying stations or set-in stations for large firms. Stratum 5 consists of those firms originally classified in size group 4 on the Iowa list of licensed egg dealers who did not respond in the mail survey or who did not return a usable questionnaire. A 20

percent random sample of these firms was chosen to aid in testing the validity of the results obtained in the mail survey. This sampling plan is summarized in table 11.

Table 10.--Usable mail questionnaires received from licensed Iowa egg handlers, distribution by number of cases of shell eggs handled per week, 1956 1/

Volume handled	Usable returns		Percentage distribution		Cumulative from large to small	
	Handlers	Annual volume	Handlers	Annual volume	Handlers	Annual volume
Cases/wk.	Number	1,000 cases	Percent	Percent	Cumulative percent	Cumulative percent
Less than 100	162	293	30.9	2.5	100.0	100.0
100 - 199	125	834	23.9	7.2	68.1	97.5
200 - 299	73	870	13.9	7.6	45.2	90.3
300 - 399	43	718	8.2	6.2	31.3	82.7
400 - 499	21	446	4.0	3.9	23.1	76.5
500 - 599	16	419	3.1	3.6	19.1	72.6
600 - 699	12	376	2.3	3.3	16.0	69.0
700 - 799	7	262	1.3	2.3	13.7	65.7
800 - 899	4	166	.8	1.4	12.4	63.4
900 - 999	6	279	1.1	2.4	11.6	62.0
1,000 and over	55	6,872	10.5	59.6	10.5	59.6
Total	524	11,535	100.0	100.0	---	---

1/ The Agricultural Estimates Division reported 12.6 million cases of eggs sold from farms in Iowa in 1955. In the table above, the 100 firms that handled 500 or more cases per week reported they handled 8.4 million cases in 1955, or 67 percent of the sales off farms.

Table 11.--Sampling plan for selection of Iowa egg handlers for the survey of shell egg shippers' pricing practices

Stratum number	Volume handled		Sampling rate	Firms to be included in sample
	Cases/yr.	Cases/wk.	Percent	Number
1	52,000 or more	1,000 or more	100	1/ 42
2	26,000-51,999	500-999	50	24
3	10,400-25,999	200-499	10	12
4	1-10,399	1-199	0	0
5	Unknown	250 or more	20	14
Total				92

1/ Excludes 13 plants of integrated firms.

Appropriate geographical distribution of the firms to be surveyed is often a consideration. To test the geographical distribution, the firms selected were located on a map. Although some clusters were apparent, the geographical distribution appeared to be adequate.

Sample Sizes Needed for the Iowa-Minnesota Price Report

The reporting of net prices received by trucklot shippers of shell eggs is in part a sampling problem. There are too many shippers of eggs in the Iowa-Minnesota area for the market news reporters to contact each one every time a report is prepared. For many of the shippers, sales of trucklots occur only once a week or less, even in the period of heavy production. On the average, approximately 50,000 cases of eggs, or the equivalent of about 100 truckload lots, are sold per day by shippers in the Iowa-Minnesota area, but finding the sellers of these 100 or more sales would require an excessively large number of telephone calls each reporting day.

Since price is a competitive tool, it should be possible to estimate average prices in a reasonably precise manner with what might appear to be extremely small samples, provided that the determinants of price level are precisely defined and categorized. The more important of these determinants, described in detail earlier in this report, are size, grade, color, package, shell treatment of the eggs, other services provided, and time of the sale. The last is particularly important, since prices often change by as much as 2 cents a dozen from day to day.

As stated earlier, one of the major needs for information on the part of egg shippers is for evaluation of current premiums and discounts in relation to the base price. These do not remain fixed over time, according to many observers. The price change from day to day to be measured by the Iowa-Minnesota reports is thus composed of two elements: Change in the level of the prices, and change in the structure of the differentials. A second need is for evaluating returns on entirely negotiated sales, but this has been shown to be so minor that it can be combined with the differential structure. Any change in the structure of the differentials can be distinguished only if actual prices reported are for narrowly identified dates, grades, and other price-determining factors, and if sampling error is small.

No information was available for estimating how much average differentials might vary from day to day. However, the market news reporters and others seemed to believe that such changes are rather significant and might amount to as much as a cent a dozen or more. They did not know to what extent such changes occur in cycles or seasonally. Nonetheless, it was decided that the sampling process should give estimates of average prices that would fall within 1/2 cent a dozen of the "true" average 95 percent of the time. It was felt that this would leave sufficient margin for detecting economically significant changes in the premium-discount structures, while at the same time serving their other uses of describing market forces at work and of permitting individual sellers to evaluate their returns relative to the returns from similar sales by other sellers.

Shipments of eggs are usually mixed truckloads, that is, they include more than one classification of eggs per load. The sizes of loads vary considerably, also. These factors would have complicated the analysis of sample sizes if the units of observation were considered to be cases. Even so, the prices of individual cases of a given lot are not independent. In fact, it is somewhat doubtful that prices of the different lots in the unit of sale are completely independent of each other. Analysis indicated considerable uniformity of lot size within classifications and relatively small variances within classifications. Consequently, it was decided that a weight of one applied to each lot was not unreasonable for a statistical analysis of sample sizes needed. The reporters use actual sizes of lots in preparing their volume-price reports.

A first approximation to sample sizes needed to give estimated mean prices within 1/2 cent of the "true" means, 95 percent of the time, was made from the data on the last two sales made by each shipper, obtained in the one-time survey. However, these sales were not for a common date, and a system of converting them to such a common time consisted of subtracting the actual net prices f.o.b. shipping point from the appropriate base price quotations. These computations gave a set of "time-standardized" net price differentials which were then used in computing estimated variances in prices at a given time for each grade, size, color, and pack classification expected to be reported regularly. These variances were then averaged, since the differences in variances of the different grades were not significant. This procedure was conservative, since the population variance measured in this way necessarily is at least as large as, and possibly larger than, when measured by a sample of an equal number of prices, all taken on the same day.

Estimated average variance taken over all classifications, estimated number of lots of each classification sold per day by all Iowa and Minnesota trucklot shippers, t-value, and the allowable error (plus or minus 1/2 cent per dozen) were inserted in the following formula:

$$n' = \frac{t^2 \ s^2}{d^2} = \frac{3.976 \ (1.33531)}{0.25} = 21.95$$

Where n' = first approximation to sample size

t^2 = value squared of t at 0.95 probability level = 3.976

s^2 = estimated average variance in the "universe" = 1.33531

d^2 = allowable error squared = $(0.5)^2$ = 0.25

This sample size estimate in relation to universe size was sufficiently large for the finite population correction factor to be applied. This was:

$$n = \frac{n'}{(1 + n'/N)}$$

Where N = estimated number of lots sold per day in each classification = 100, as a first measure.

The corrected estimate of n was about 18. Estimates made later from prices collected during the pilot reporting period reduced the estimate of n to 16. The average variance was reduced to 1.16616. A test of the impact of the assumed weight of one for each lot was made. The variances using weighted and simple average prices were computed from the data for 3 different but fairly normal days, March 3, 17, and 26, 1958. The weighted-average s^2 was 1.3296 and the simple average s^2 was 1.4485 for the above 3 days. The weighted-average method of analyzing the precision of the prices indicated at least 17 sales would be needed to issue a price within the 1/2-cent confidence limit 95 percent of the time, while the simple average method indicated 19 sales. Therefore, the variation in the size of the lots does have a bearing on the number of sales required to issue a representative price report. However, the difference is not large enough to warrant the additional work involved to analyze the prices on a weighted-average basis.

The reduction in sample sizes when estimates were based on variation in prices around day-to-day averages for the samples, as compared to the "time-standardization" method, suggested that these averages varied around some "normal" relationship to the base price quotations. There were several plausible reasons for suspecting that such variations would occur. These were: (1) Sampling variation as such from a fixed structure; (2) seasonal changes in relationships for particular classifications; (3) short-run cycles in relationships for all classifications due to alternating conditions commonly classified as "buyers" versus "sellers" market for trucklot sales or for wholesale sales in New York City; and (4) double sampling variation, caused by variation in both individual price differentials and in the number of lots for which information was obtained. The second and third possible causes were considered by the Dairy and Poultry Market News Service and others to be significant for table eggs, the type for which this statistical analysis is made, and constituted a part of the justification for this project. However, the first and fourth causes are of more direct concern in daily sample size estimates.

Generally, there are a number of firms that report sales on more than one lot of certain classifications of eggs on some days, while others report none. Consequently, the actual universe varies around the 100 lots used in estimating sample sizes needed for a confidence interval of 1/2 cent per dozen on the average of the prices reported. As shown earlier, weekly sales are unevenly distributed through the week. One method of handling this problem is to use the information obtained in the telephone contacts to estimate universe size each day; that is, average universe size multiplied by the ratio of number of lots for which information was obtained to estimated average number of lots sold per day by all firms contacted on the particular day. No measure of the precision of such a ratio estimator has been computed. Such estimators are biased, and variances of the estimates can be computed only by approximate methods even for large samples. For small samples such as those envisioned here, computational formulas have not been established (1).

It is simple to estimate the size of sample needed to obtain the level of precision desired, assuming that universe size is estimated correctly. The formula is:

$$N = \frac{n'}{(1 + n'/N)}$$

Where $n' = 18.54$

The following tabulation indicates the required sample sizes for various sizes of universes:

When universe is:	150	100	50	25	10
Sample should be:	17	16	14	11	6

This tabulation indicates that variation in size of the universe has little impact on sample sizes needed, and the reporters may simply establish 12 or more lots as a normal goal. The data reported earlier on proportion of sales on each day of the week indicate that universe sizes will normally be about 125 trucklots on Mondays and 50 or more on Thursdays. Most trucklots contain at least two of the three table egg grades or classes most frequently marketed.

Experience obtained during the trial reporting period indicated that on many days information from the entire sample would not reveal as many as 12 lots for particular categories. In fact, only 2 or 3 sales may be found for certain classifications. Using sample results to estimate universe sizes for such so-called "scarcity" items is hazardous. Even so, the tabulation above indicates that the specified degree of precision cannot be obtained with less than full coverage of any universe smaller than 25 sales, since roughly 60 percent of the firms in the area cannot be or have not been contacted or refused to cooperate on each given day. Whether this percentage is too high is difficult to decide. Long-distance telephone contact with 60 or more firms in a 2-hour period requires careful allotment of time on the part of the reporters and exacting cooperativeness in being at desks on the part of the shippers.

Reporting prices on classifications for which fewer than 12 sales have been found is subject to the reporters' judgment. The variability in the structure of the universe does not permit thin coverage. However, occasional reporting in such cases can be justified on the grounds of continuity of service, providing information when the markets are changing rapidly, and maintaining a given format for daily reports.

One possibility open to the reporters is to report nominal prices when the number of lots for which information has been obtained is 12 or less. These nominal prices are usually considered to be those last reported for the particular categories. The standard deviation of changes in the reported "mostly" prices from time to time for 1959 was approximately 0.7 cent a dozen. Thus, the use of nominal prices on a semi-weekly schedule may be inadmissible. The confidence interval at the 0.95 probability level would be twice this standard deviation plus the half confidence interval of the last reported estimate (0.5), or about 2.0 cents a dozen on either side of the true average.

A second possibility would be to use the information obtained on other categories to estimate change for a particular category. This proves to be less reliable than the use of nominal prices would be, since the standard deviation of differences in changes in "mostly" prices from time to time for 1959 was approximately 1.1 cents a dozen.

A third possibility is for the reporters to use matched-plant estimators. The advantage of the matched-plant estimator is that the specified level of accuracy can be achieved with fewer observations than are necessary for a random sample. However, the disadvantage of the matched-plant estimator is the difficulty of obtaining a sufficient volume of prices for matching purposes. To qualify in the matching process, similar firms need to report prices on similar categories of eggs in each of two time periods. Frequently, prices are available in the current period but not in the previous period, or vice versa. As a check on the feasibility of using the matched-plant estimator, shipping-point prices were analyzed for the firms that reported prices consistently for the largest category of egg prices--Grade A large mixed colors in wholesale packs. For the period March 25, 1958, to June 3, 1958, it was possible to match prices for all except one of the Tuesdays (prices were collected on Tuesdays at the beginning of the price reporting activity). However, during this period it was possible to match prices for only 3 of the 10 Thursdays (table 12). This difficulty might have been anticipated because the initial survey revealed the heavier distribution of sales in the early part of the week as compared with the latter part of the week.

If the matched-plant method were used as a procedure by the market news reporters, two things would be required: (1) Prices would need to be obtained from eight firms each reporting period that matched with the previous reporting period in order to obtain the degree of accuracy desired. In practice, it might be more difficult to obtain this degree of matching than to collect the 12 sales established earlier as a normal goal for the random sample approach. (2) The required number of sales would have to be obtained for each grade and size of egg that is to be reported to the public. If this

procedure is used, prices obtained for the matched plants should be checked occasionally against prices received by other firms in the statistical universe. Reliance upon such a small group of firms as only eight could easily result in rigging and collusion. In the absence of rigging and collusion, matching would give a more reliable measure of change over time than do random samples of the same size.

Table 12.--Summary of variances obtained by matching plants with sales of Grade A large mixed colored eggs and prices received by Iowa-Minnesota shippers March 25 through June 3, 1958, and number of sales needed to obtain 1/2-cent accuracy

Matched dates	Matched plants	s^2	Sales needed for 1/2-cent accuracy
	Number	Cents per dozen	Number
Tuesdays			
3/25 and 4/1	3	0.4180	7
4/1 and 4/8	5	.5250	8
4/8 and 4/15	4	.4520	7
4/15 and 4/22	5	.5425	8
4/29 and 5/6	3	.4750	7
5/6 and 5/13	3	.3142	5
5/13 and 5/20	5	.5015	8
5/20 and 5/27	4	.5066	8
5/27 and 6/3	5	.5125	8
Thursdays			
4/3 and 4/10	5	.3900	6
4/10 and 4/17	8	.4278	7
4/17 and 4/24	3	.3325	5

LITERATURE CITED

(1) Cochran, W. G.
1953. Sampling Techniques, John Wiley and Sons, New York.

(2) Conlogue, R. M.
1959. Candling and Cartoning Eggs at Country Plants. Mktg. Res. Rpt. No. 366, Agr. Mktg. Serv., U. S. Dept. Agr., Washington, D. C.

(3) Faber, F. L.
1958. New Marketing Report Traces Commercial Egg Movement. Poultry Processing and Marketing, Vol. 64, No. 6, Watt Publishing Co., Mount Morris, Ill. June.

(4) Faber, F. L., and Pedersen, J. R.
1959. Number, Size, and Location of Egg Assemblers. AMS-311, Agr. Mktg. Serv., U. S. Dept. Agr., Washington, D. C.

(5) Gerald, J. O., and Pritchard, N. T.
1958. Pricing Eggs at Wholesale in New York City. Mktg. Res. Rpt. No. 210, Agr. Mktg. Serv., U. S. Dept. Agr., Washington, D. C.

(6) Hester, O. C., and Pritchard, N. T.
1957. Pricing Eggs in Los Angeles. Mktg. Res. Rpt. No. 161, Agr. Mktg. Serv., U. S. Dept. Agr., Washington, D. C.

(7) Mathis, A. G.
1959. Problems in Initiating a Report of Prices Received for Butter by Midwestern Creameries. AMS-292, Agr. Mktg. Serv., U. S. Dept. Agr., Washington, D. C.

(8) Pritchard, N. T., and Hester, O. C.
1957. Pricing Eggs at Wholesale in Chicago and St. Louis. Mktg. Res. Rpt. No. 173, Agr. Mktg. Serv., U. S. Dept. Agr., Washington, D. C.

SELECTED REFERENCES

Baker, R. L.
1958. Pricing Practices of Major Country-Point Egg Handlers in Pennsylvania. Pa. Agr. Expt. Sta. Bul. 640.

Benjamin, E. W., Gwin, J. M., Faber, F. L., and Termohlen, W. D.
1960. Marketing Poultry Products. 5th ed., John Wiley and Sons, New York.

Brown, A. A.
1954. Egg Pricing on the Boston Market. Univ. Mass. Agr. Expt. Sta. Bul. 476, Amherst, Mass.

Buell, B. C.
1960. Country-Point Price Reporting for Eggs. Accomplishments in Marketing Through Service Programs. AMS-388, pp. 32-35, U. S. Dept. Agr., Washington, D. C.

Duddy, E. A.
1954. The Place of Terminal Markets. Yearbook of Agriculture, U. S. Dept. Agr., Washington, D. C.

Earle, W., and Darrah, L. B.
1952. Egg Prices on the New York City Market. A. E. 816, Dept. of Agr. Econ., N. Y. State College of Agriculture, Ithaca, N. Y.

Feder, E.
1953. Market News on Eggs and Poultry in South Dakota. S. Dak. Agr. Expt. Sta., College Station, S. Dak., Bul. 428.

Manchester, A. C.
1954. Price-making and Price Reporting in the Boston Egg Market. Harvard Studies in Marketing Farm Products, No. 7-H, Harvard Univ., Cambridge, Mass.

March, R. W., and Herrmann, L. F.
1953. Establishment of Central Market Butter Prices in Chicago and New York. Mktg. Res. Rpt. No. 53, Prod. and Mktg. Admin., U. S. Dept. Agr., Washington, D. C.

Norton, L. J.
1954. Essentials of Good Terminals. Yearbook of Agriculture, U. S. Dept. Agr., Washington, D. C.

Oyloe, T.
1958. Marketing Policies and Practices of Country Egg Dealers in Eastern South Dakota. S. Dak. Agr. Expt. Sta. Cir. 143, College Station, S. Dak.

Pedersen, J. R.
1959. Development of a Report on Turkey Prices at Shipping Points in Eight North Central States. AMS-355, Agr. Mktg. Serv., U. S. Dept. Agr., Washington, D. C.

Pritchard, N. T.
1959. Pricing Eggs in Central Markets. AMS-287, Agr. Mktg. Serv., U. S. Dept. Agr., Washington, D. C.

Roberts, J. B.
1943. Marketing and Pricing Eggs in Kentucky. Ky. Agr. Expt. Sta. Bul. 441, Lexington, Ky.

Ruttan, V. W., and Laird, W. F.
1957. Pricing of Indiana Eggs at Country and Terminal Markets. Purdue Univ. Agr. Expt. Sta. SB 648, Lafayette, Ind.

Shepherd, G. S.
1954. Changes in Structure, Yearbook of Agriculture, U. S. Dept. Agr., Washington, D. C.

Vogt, K.
1934. Interrelationships of Daily Prices and Supply in the New York Egg Market. Cornell Agr. Expt. Sta. Bul. 596, Ithaca, N. Y.

* U.S. GOVERNMENT PRINTING OFFICE 1961 O—579282